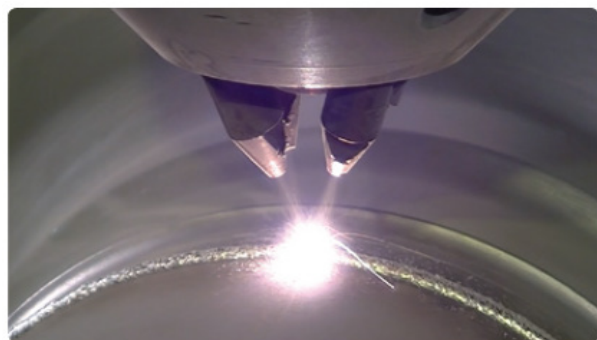




LENS[®] 150 ADDITIVE MANUFACTURING CONTROLLED ATMOSPHERE SYSTEM

The LENS[®] 150 brings industrial-strength metal 3D Printing technology to the laboratory and classroom

Additive Manufacturing, also known as 3D Printing, has recently emerged as the first manufacturing revolution of the 21st Century. Industrial applications are growing rapidly and processes are being qualified in numerous industries. In the area of metal Additive Manufacturing, applications such as repair, rework, coating and low volume manufacturing are being implemented across a wide range of industries, including oil and gas, aerospace, mining, power generation and medical.



LENS in Action Repairing a Casing

The all-new LENS 150 system offers a low cost entry to metal Additive Manufacturing. With a 150mm cubed working volume, 400W fiber laser and full LENS control software, the LENS 150 gives the user the same process as the industry-proven LENS Classic and Machine Tool Series Systems, but with a smaller footprint and at a lower cost.

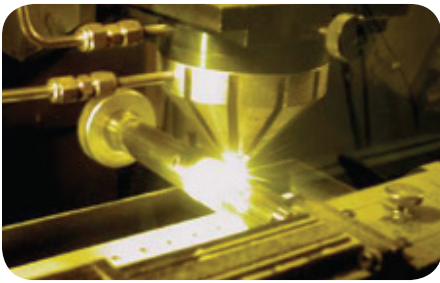
LENS 150 AM CA FEATURES

- ▶ Blown Powder Deposition – visible, teachable process
- ▶ Industry-proven LENS process
- ▶ Rapid set-up – make a new material in ten minutes!
- ▶ High brightness solid-state Fiber Laser
- ▶ Rapid solidification rates (>1000C) – Novel microstructures
- ▶ Complete Atmosphere Control – full protection for highest quality
- ▶ Create mixtures - rapid alloy discovery

LENS APPLICATIONS

- ▶ Teaching and research on metal 3D Printing
- ▶ Rapid Manufacturing
- ▶ Rapid Prototyping
- ▶ Hybrid Manufacturing
- ▶ Rapid Alloy Screening
- ▶ Repair & Remanufacture

Laser Engineered Net Shaping



How the LENS system works:

LENS systems utilize a high-power laser together with powdered metals to build fully dense structures directly from a 3-dimensional CAD solid model.

The CAD model is automatically sliced into a tool-path, which instructs the LENS machine how to build the part. The part is constructed layer by layer under the control of software that monitors a variety of parameters to ensure geometric and mechanical integrity.

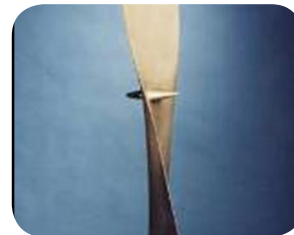
The LENS process is housed in a chamber which is purged with argon such that the oxygen level stays below 10 parts per million to ensure there is no impurity pick-up during deposition. The metal powder is fed to the process by Optomec's proprietary powder-feed system, which is able to flow small quantities of powder very precisely. When complete, the part is removed and can be heat-treated, Hot-Isostatic Pressed, machined, or finished in any other manner.

150 ADDITIVE MANUFACTURING CONTROLLED ATMOSPHERE SYSTEM

SPECIFICATIONS		CS 150 AM CA
AUTOMATION	XYZ Travel (mm)	150x150x150
	Table Size XY (mm) / Payload (kg)	229x229 / 50
	Positional Accuracy (mm)	± 0.014
	Positional Repeatability (mm)	± 0.003
	CNC Controller	Win7/Galil
	System Weight (kg)	600
	System Dimensions (mm)	2000x1000x1000
LENS DEPOSITION	CDRH Class 1 Airtight Enclosure	Standard
	Pneuma Seal Door	Standard Door
	Oxygen/Moisture Level (ppm)	< 10
	Standard Powder Feeders	Up to 4
	Laser Power Standard (W)	400
	2.5D Tool Path Software	Option



Defense Housing
Fabricated by LENS System



Compressor Blade
Repaired by LENS System



Exhaust Duct
Fabricated by LENS System

ABOUT OPTOMECC

Optomec® is a privately-held, rapidly growing supplier of Additive Manufacturing systems. Optomec's patented Aerosol Jet Systems for printed electronics and LENS 3D Printers for metal components are used by industry to reduce product cost and improve performance. Together, these unique printing solutions work with the broadest spectrum of functional materials, ranging from electronic inks to structural metals and even biological matter. Optomec has more than 300 marquee customers around the world, targeting production applications in the Electronics, Energy, Life Sciences and Aerospace industries. For more information about Optomec, visit <http://www.optomec.com>.



Optomec Inc.
3911 Singer Blvd. NE
Albuquerque, NM 87109 USA

Tel: 505-761-8250
Fax: 505-761-6638
E-mail: sales@optomec.com



LENS[®] 500 HYBRID CONTROLLED ATMOSPHERE SYSTEM

Affordable Hybrid Machine for the Fabrication and Restoration of High Value Metal Components.



LENS 500 HY CA System. An additive only controlled atmosphere model, LENS 500 AM CA, is also available.

The LENS 500 Hybrid Controlled Atmosphere System sets a new standard in affordability and performance for titanium and aluminum metal additive manufacturing applications. The system incorporates an Optomec proprietary hermetically sealed Class 1 enclosure and an integrated gas purification system that maintains oxygen and moisture levels to below 40 ppm.

Built on a rugged cast iron CNC platform, the system features high precision ball screws, spindle, and ATC for precision machining operations. Additive functionality is enabled with integrated Optomec LENS Print Engine technology including Steadyflow™ powder feeders, water-cooled LENS processing head, and SmartAM™ closed loop controls. A high power fiber laser and advanced Siemens controls complete the system. Powerful Optomec software enables multi-axis build strategies that combine additive and subtractive operations in a single tool path. Optional material starter recipes and unparalleled customer service and support round out the LENS 500 Hybrid Controlled Atmosphere System.

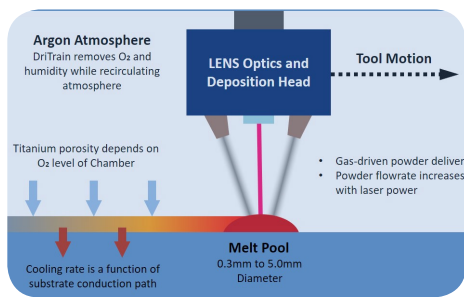
LENS 500 HY CA FEATURES

- ▶ Full Atmosphere Control – superior metal quality
- ▶ Cast Iron CNC Platform – affordable rugged base
- ▶ Full CNC Machining Capability – finished parts in one set-up
- ▶ Full LENS Additive Capability – industry proven technology
- ▶ Up to 5 Axis Motion – for complex parts/repairs
- ▶ Fiber Laser – high performance/reliability
- ▶ Closed Loop Controls – part to part consistency
- ▶ Common materials: Inconel Alloys, Stainless Steels, Titanium alloys

LENS APPLICATIONS

- ▶ Hybrid Manufacturing
- ▶ Finished Functional Prototypes
- ▶ Repair damaged/worn parts
- ▶ Restore mis-machined components
- ▶ Remanufacturing of legacy parts

Laser Engineered Net Shaping



How the LENS Process works:

The LENS process is housed in a chamber which is purged with argon such that oxygen and moisture levels stay below 40 parts per million for LENS Hybrid CA Systems and 10 parts per million for LENS Additive CA Systems. This ensures there is no impurity pickup during deposition.

The LENS Deposition head delivers the laser and powder to the deposition zone. Metal powder is conveyed through nozzles to the focal point of the laser creating a melt pool. Argon gas is used to deliver the powder and protect the melt pool from contamination.

Toolpaths are generated from a CAD model and instruct the LENS system to build or machine the part using standard G & M commands. Material starter recipes provide pre-qualified LENS processing parameters to print a variety of commonly used powders including Titanium, Inconel, and Steels. The part is built layer by layer under the control of software that monitors a variety of parameters to ensure geometric and mechanical integrity. When complete, the part is removed and can be heat-treated, Hot-Isostatic Pressed, machined or finished in any other manner.

LENS 500 Hybrid CA System

	SPECIFICATIONS	LENS 500 HYBRID CA SYSTEM	LENS 500 AM CA SYSTEM
AUTOMATION PLATFORM	Additive Mode XYZ Travel (mm)	350x325x500	500x325x500
	Subtractive Mode XYZ Travel (mm)	500x325x500	NA
	Table Size XY (mm) / Payload (kg)	600x300 / 100	600x300 /200
	Positional Accuracy (mm)	± 0.005	± 0.005
	Positional Repeatability (mm)	± 0.0025	± 0.0025
	Rotary Table A Axis (Optional)	Removable	Removable
	Additive Mode XYZ Travel (mm)	200x325x500	350x325x500
	Subtractive Mode XYZ Travel (mm)	350x325x500	NA
	Table Ø (mm) / Payload (kg)	170 / 100 with Tailstock	170 /100
	Trunnion (Optional)	Removable	Permanent
	Additive Mode XYZ Travel (mm)	350x325x300	500x325x450
	Subtractive Mode XYZ Travel (mm)	500x325x300	NA
	Table Ø (mm)	120	120
	Maximum workpiece size Ø, H (mm)	177x300	177x450
Maximum workpiece weight (kg)	35	35	
Rotary axis "C" (degrees)	360	360	
Tilt range "A" axis (+/- degrees)	± 110	± 110	
CNC Controller	Siemens 828	Siemens 828	
Marposh Touch Probe	Option	Option	
System Approx Weight (kg)	2500	2500	
System Dimensions (mm)	1650x2050x2050	1650x2050x2050	
LENS DEPOSITION	CDRH Class 1 / Airtight Enclosure	Standard	Standard
	Antechamber Ø (mm)	375	375
	Pneuma Seal Door with Glove Access	Standard / 2 Glove Ports	Standard /2 Glove Ports
	Oxygen/Moisture Level (ppm)	< 40	< 10
	Powder Feeders	Up to 4	Up to 4
	Laser Power Range (W)	500 -2000	500 -2000
	Closed Loop Process Control	Option	Option
	2.5D Tool Path Software	Option	Option
5 Axis Tool Path Software	Option	Option	
MACHINING	Tool Changer	8 Tool Umbrella Type	NA
	Tool Taper	CAT 40	NA
	Spindle (rpm)	8,000	NA
	Spindle Center Distance to Column Surface (m)	381	NA
	Spindle Nose to Table Surface (mm)	76 - 584	NA
	Spindle Motor Peak (W)	5600	NA
	Spindle Torque (Nm)	47.4	NA

ABOUT OPTOMECC

Optomec® is a privately-held, rapidly growing supplier of Additive Manufacturing systems. Optomec's patented Aerosol Jet Systems for printed electronics and LENS 3D Printers for metal components are used by industry to reduce product cost and improve performance. Together, these unique printing solutions work with the broadest spectrum of functional materials, ranging from electronic inks to structural metals and even biological matter. Optomec has more than 300 marquee customers around the world, targeting production applications in the Electronics, Energy, Life Sciences and Aerospace industries. For more information about Optomec, visit <http://www.optomec.com>.



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LENS[®] 500 HYBRID OPEN ATMOSPHERE SYSTEM

Value Leading Machine Tool for Hybrid Additive and Subtractive Metal Processing.



The LENS 500 Hybrid Open Atmosphere System sets a new price to performance standard for combining additive and subtractive manufacturing in a single machine tool. The system utilizes Optomec industry proven LENS Print Engine technology seamlessly integrated into Class 1 Laser Safe CNC platform. The system is ideally suited for processing stainless and tool steels, nickel-based alloys, cobalt, tungsten and other non-reactive metals.

Built on a rugged cast iron CNC platform, the system features high precision ball screws, spindle, and ATC for precision machining operations. Additive functionality is enabled with integrated Optomec LENS technology including Steadyflow™ powder feeders, water-cooled LENS processing head with interchangeable powder delivery nozzles, and SmartAM™ closed-loop controls. A high power fiber laser and advanced Siemens controls complete the system.

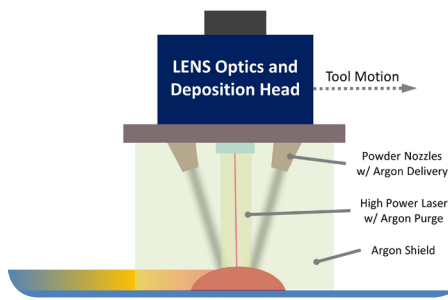
LENS 500 HY CA FEATURES

- ▶ Cast Iron CNC Platform – affordable rugged base
- ▶ Full CNC Machining Capability – finished parts in one set-up
- ▶ Full LENS Additive Capability – industry proven technology
- ▶ Up to 5 Axis Motion – for complex parts/repairs
- ▶ Fiber Laser – high performance/reliability
- ▶ Closed Loop Controls – part to part consistency
- ▶ Common materials: Tool and Stainless Steels, Inconels, Hastelloy, Stellite, Tungsten Carbide

LENS APPLICATIONS

- ▶ Hybrid and/or Additive Manufacturing
- ▶ Finished Functional Prototypes
- ▶ Repair damaged/worn parts
- ▶ Restore mis-machined components
- ▶ Remanufacturing of legacy parts

Laser Engineered Net Shaping



How the LENS Process works:

The Optomec Machine Tool Series Open Atmosphere system is housed in a Class 1 chamber so that all laser hazards are contained within the enclosure.

The LENS Deposition head delivers the laser and powder to the deposition zone. Metal powder is conveyed through nozzles to the focal point of the laser creating a melt pool. Argon gas is used to deliver the powder and protect the melt pool from contamination. A curtain of argon gas provides additional shielding for the local build area. Tool-paths created from standard G & M codes or from a CAD model instruct the LENS machine how to build the part. Material starter recipes provide pre-qualified LENS processing parameters to print a variety of commonly used powders including Inconel, and Steels.

The part is built layer by layer under the control of software that monitors a variety of parameters to ensure geometric and mechanical integrity. When complete, the part is removed and can be heat-treated, Hot-Isostatic Pressed, machined, or finished in any other manner.

LENS 500 HYBRID OPEN ATMOSPHERE SYSTEM

SPECIFICATIONS		LENS 500 HYBRID OA SYSTEM	LENS 500 AM OA SYSTEM
AUTOMATION PLATFORM	Additive Mode XYZ Travel (mm)	350x325x500	500x325x500
	Subtractive Mode XYZ Travel (mm)	500x325x500	NA
	Table Size XY (mm) / Payload (kg)	600x300 / 200	600x300 / 200
	Positional Accuracy (mm)	± 0.005	± 0.005
	Positional Repeatability (mm)	± 0.0025	± 0.0025
	Rotary Table A Axis (Optional)	Removable	Removable
	Additive Mode XYZ Travel (mm)	200x325x500	350x325x500
	Subtractive Mode XYZ Travel (mm)	350x325x500	NA
	Table Ø (mm) / Payload (kg)	170 / 100 with Tailstock	170 / 100
	Trunnion (Optional)	Removable	Permanent
	Additive Mode XYZ Travel (mm)	350x325x300	500x325x450
	Subtractive Mode XYZ Travel (mm)	500x325x300	NA
	Table Ø (mm)	120	120
	Maximum workpiece size Ø, H (mm)	177x300	177x450
	Maximum workpiece weight (kg)	35	35
	Rotary axis "C" (degrees)	360	360
Tilt range "A" axis (+/- degrees)	± 110	± 110	
CNC Controller	Siemens 828	Siemens 828	
Marposh Touch Probe	Option	Option	
System Approx Weight (kg)	2500	2500	
System Dimensions (mm)	1650x2050x2050	1650x2050x2050	
LENS DEPOSITION	CDRH Class 1 Laser Enclosure	Standard	Standard
	Interlocked Front Door Access	Standard	Standard
	Powder Feeders	Up to 4	Up to 4
	Laser Power Range (W)	500 -2000	500 -2000
	Closed Loop Process Control	Option	Option
	2.5D Tool Path Software	Option	Option
	5 Axis Tool Path Software	Option	Option
MACHINING	Tool Changer	8 Tool Umbrella Type	NA
	Tool Taper	CAT 40	NA
	Spindle (rpm)	8,000	NA
	Spindle Center Distance to Column Surface (mm)	381	NA
	Spindle Nose to Table Surface (mm)	76 - 584	NA
	Spindle Motor Peak (W)	5600	NA
	Spindle Torque (Nm)	47.4	NA

ABOUT OPTOMECC

Optomec® is a privately-held, rapidly growing supplier of Additive Manufacturing systems. Optomec's patented Aerosol Jet Systems for printed electronics and LENS 3D Printers for metal components are used by industry to reduce product cost and improve performance. Together, these unique printing solutions work with the broadest spectrum of functional materials, ranging from electronic inks to structural metals and even biological matter. Optomec has more than 300 marquee customers around the world, targeting production applications in the Electronics, Energy, Life Sciences and Aerospace industries. For more information about Optomec, visit <http://www.optomec.com>.



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LENS[®] 860 HYBRID CONTROLLED ATMOSPHERE SYSTEM

Larger Work Envelope & Higher Power Bring More Capabilities for Affordable, High Quality Metal Hybrid Manufacturing.



LENS 860 HY CA System. An additive only controlled atmosphere model. LENS 860 AM CA is also available.

The LENS 860 is the newest model in the affordable Optomec Hybrid system line-up. With an 860x600x610 mm work envelope the system enables additive and subtractive manufacturing of mid-size and large parts. The LENS 860 comes standard with a hermetically sealed build chamber and closed loop atmosphere controls for producing parts with superior metal quality. The LENS 860 can be configured with a high power 3 kW fiber laser reducing manufacturing time for building, repairing or coating parts.

Built on a rugged CNC platform, the system features a 16 tool ATC and an 8,000 or optional 10,000 RPM spindle for machining operations. The base LENS 860 system is equipped with a 3-linear axis motion system, but optionally can be delivered with a user interchangeable rotary table and/or tilt-rotate trunnion for 4 and 5 axis for additive and subtractive metal processing. Additive manufacturing is enabled with the industry proven LENS Print Engine technology including integrated Steadyflow™ powder feeders, water-cooled LENS deposition head, and SmartAM™ closed loop process controls.

A Siemens controller manages the system's additive and subtractive functions through an easy to use HMI. Powerful Optomec software enables multi-axis build strategies that combine additive and subtractive operations in a single tool path program. Optional material starter recipes and unparalleled customer service and support round out the LENS 860 Hybrid Controlled Atmosphere System.

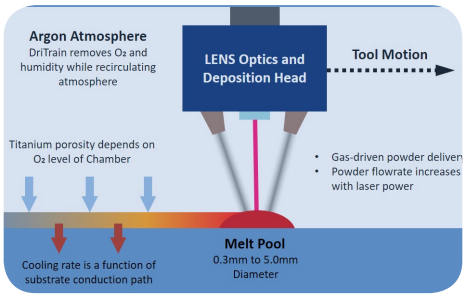
LENS 860 HY CA FEATURES

- ▶ Full Atmosphere Control – superior metal quality
- ▶ Large Build Volume – process larger parts
- ▶ Rugged CNC Base – affordable system platform
- ▶ Full CNC Machining Capability – finished parts in one set-up
- ▶ Full LENS Additive Capability – industry proven technology
- ▶ Up to 5 Axis Motion – for complex parts/repairs
- ▶ High Power Laser – faster processing
- ▶ Closed Loop Controls – part to part consistency
- ▶ Common materials: Inconel Alloys, Stainless Steels, Titanium alloys

LENS APPLICATIONS

- ▶ Hybrid Manufacturing
- ▶ Finished Functional Prototypes
- ▶ Repair damaged/worn parts
- ▶ Restore mis-machined components
- ▶ Remanufacturing of legacy parts

Laser Engineered Net Shaping



How the LENS Process works:

The LENS process is housed in a chamber which is purged with argon such that oxygen and moisture levels stay below 40 parts per million for LENS Hybrid CA Systems and 10 parts per million for LENS Additive CA Systems. This ensures there is no impurity pickup during deposition.

The LENS Deposition head delivers the laser and powder to the deposition zone. Metal powder is conveyed through nozzles to the focal point of the laser creating a melt pool. Argon gas is used to deliver the powder and protect the melt pool from contamination.

Toolpaths are generated from a CAD model and instruct the LENS system to build or machine the part using standard G & M commands. Material starter recipes provide pre-qualified LENS processing parameters to print a variety of commonly used powders including Titanium, Inconel, and Steels. The part is built layer by layer under the control of software that monitors a variety of parameters to ensure geometric and mechanical integrity. When complete, the part is removed and can be heat-treated, Hot-Isostatic Pressed, machined or finished in any other manner.

LENS 860 HYBRID CONTROLLED ATMOSPHERE SYSTEM

	SPECIFICATIONS	LENS 860 HYBRID CA SYSTEM	LENS 860 AM CA SYSTEM
AUTOMATION PLATFORM	Additive Mode XYZ Travel (mm)	598x600x610	860x600x610
	Subtractive Mode XYZ Travel (mm)	860x600x610	NA
	Table Size XY (mm) / Payload (kg)	1000x600 / 600	1000x600 / 600
	Positional Accuracy (mm)	± 0.005	± 0.005
	Positional Repeatability (mm)	± 0.003	± 0.003
	Rotary Table A Axis (Optional)	Removable	Removable
	Additive Mode XYZ Travel (mm)	598x600x610	860x600x610
	Subtractive Mode XYZ Travel (mm)	860x600x610	NA
	Table Ø (mm)	170	170
	Trunnion 170 (Optional)	Removable	Removable
	Additive Mode XYZ Travel (mm)	598x600x350	860x600x460
	Subtractive Mode XYZ Travel (mm)	860x600x350	NA
	Table Size Ø (mm)	170	170
	Maximum Workpiece Size Ø, H (mm)	260 x 350	260 x 460
	Maximum Workpiece Weight Horz/Vert (kg)	100 / 50	100 / 50
	Rotary Axis "C" (degrees)	360	360
	Tilt Range "A" axis (+/- degrees)	-15 / +115	-15 / +115
	Trunnion 250 (Optional)	Permanent	Permanent
	Additive Mode XYZ Travel (mm)	598x600x360	860x600x480
	Subtractive Mode XYZ Travel (mm)	860x600x360	NA
Table Size Ø (mm)	250	250	
Maximum Workpiece Size Ø, H (mm)	335x360	335x480	
Maximum Workpiece Weight Horz/Vert (kg)	100 / 75	100 / 75	
Rotary Axis "C" (degrees)	360	360	
Tilt Range "A" axis (degrees)	-30 / +120	-30 / +120	
CNC Controller	Siemens 840D	Siemens 840D	
Touch Probe	Option	Option	
System Approx weight (kg)	5960	5960	
System Dimensions (mm)	4068x2735x2660	4068x2735x2660	
LENS DEPOSITION	CDRH Class 1 Airtight Enclosure	Standard	Standard
	Antechamber Ø (mm)	375	375
	Pneuma Seal Door with Glove Access	Standard/3 Glove Ports	Standard/3 Glove Ports
	Oxygen/Moisture Level (ppm)	< 40	< 10
	Standard Powder Feeders	Up to 4	Up to 4
	Laser Power Standard (W)	500 - 3000	500 -3000
	Closed Loop Process control	Option	Option
	2.5D Tool Path Software	Option	Option
5 Axis Tool Path Software	Option	Option	
MACHINING	Tool Changer	16 Tool Carousel	NA
	Tool Taper	CAT 40	NA
	Spindle (rpm)	8,000	NA
	Spindle Center Distance to Column Surface (mm)	700	NA
	Spindle Nose to Table Surface (mm)	120-730	NA
	Spindle Motor Peak (W)	7000	NA
	Spindle Torque (Nm)	95	NA

ABOUT OPTOMECC

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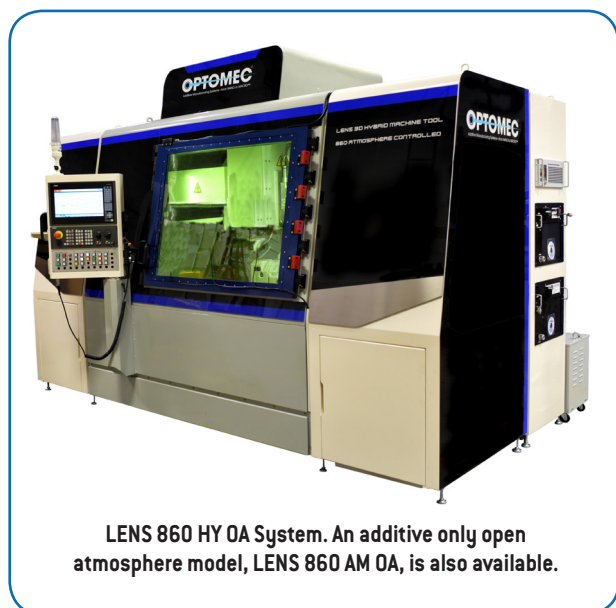
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Larger Work Envelope & Higher Power Bring More Capabilities for Affordable, High Quality Metal Hybrid Manufacturing.



LENS 860 HY OA System. An additive only open atmosphere model, LENS 860 AM OA, is also available.

The LENS 860 is the newest model in the affordable Optomec Hybrid system line-up. With an 860x600x610 mm work envelope the system enables additive and subtractive manufacturing of mid-size and large parts. The LENS 860 Open Atmosphere System utilizes Optomec industry proven LENS Print Engine technology seamlessly integrated into a CNC platform upgraded with a Class 1 Laser Safe enclosure. The LENS 860 can be configured with a high power 3 kW fiber laser reducing manufacturing time for building, repairing or coating parts.

Built on a rugged CNC platform, the system features a 16 tool ATC and an 8,000 or optional 10,000 RPM spindle for machining operations. The base LENS 860 system is equipped with a 3-linear axis motion system, but optionally can be delivered with a user interchangeable rotary table and/or tilt-rotate trunnion for 4 and 5 axis for additive and subtractive metal processing. The system is ideally suited for processing stainless and tool steels, nickel based alloys, cobalt, tungsten and other non-reactive metals.

A Siemens controller manages the system's additive and subtractive functions through an easy to use HMI. Powerful Optomec software enables multi-axis build strategies that combine additive and subtractive operations in a single tool path program. Optional material starter recipes and unparalleled customer service and support round out the LENS 860 Hybrid Open Atmosphere System.

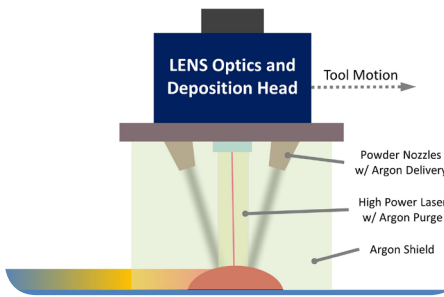
LENS 860 HY OA FEATURES

- ▶ Large Build Volume – process larger parts
- ▶ Rugged CNC Base – affordable system platform
- ▶ Full CNC Machining Capability – finished parts in one set-up
- ▶ Full LENS Additive Capability – industry proven technology
- ▶ Up to 5 Axis Motion – for complex parts/repairs
- ▶ High Power Laser – faster processing
- ▶ Closed Loop Controls – part to part consistency
- ▶ Common materials: Inconel Alloys, Stainless Steels, Cobalt, Tungsten

LENS APPLICATIONS

- ▶ Hybrid Manufacturing
- ▶ Finished Functional Prototypes
- ▶ Repair damaged/worn parts
- ▶ Restore mis-machined components
- ▶ Remanufacturing of legacy parts

Laser Engineered Net Shaping



How the LENS Process works:

The Optomec Machine Tool Series Open Atmosphere system is housed in a Class 1 chamber so that all laser hazards are contained within the enclosure. The LENS Deposition head delivers the laser and powder to the deposition zone. Metal powder is conveyed through nozzles to the focal point of the laser creating a melt pool. Argon gas is used to deliver the powder and protect the melt pool from contamination.

A curtain of argon gas provides additional shielding for the local build area. Tool-paths created from standard G & M codes or from a CAD model instruct the LENS machine how to build the part. Material starter recipes provide pre-qualified LENS processing parameters to print a variety of commonly used powders including Inconel, and Steels.

The part is built layer by layer under the control of software that monitors a variety of parameters to ensure geometric and mechanical integrity. When complete, the part is removed and can be heat-treated, Hot-Isostatic Pressed, machined, or finished in any other manner.

LENS 860 HYBRID OPEN ATMOSPHERE SYSTEM

SPECIFICATIONS		LENS 860 HYBRID OA SYSTEM	LENS 860 AM OA SYSTEM
AUTOMATION PLATFORM	Additive Mode XYZ Travel (mm)	598x600x610	860x600x610
	Subtractive Mode XYZ Travel (mm)	860x600x610	NA
	Table Size XY (mm) / Payload (kg)	1000x600 / 600	1000x600 / 600
	Positional Accuracy (mm)	± 0.005	± 0.005
	Positional Repeatability (mm)	± 0.003	± 0.003
	Rotary Table A Axis (Optional)	Removable	Removable
	Additive Mode XYZ Travel (mm)	598x600x610	860x600x610
	Subtractive Mode XYZ Travel (mm)	860x600x610	NA
	Table Ø (mm)	170	170
	Trunnion 170 (Optional)	Removable	Removable
	Additive Mode XYZ Travel (mm)	598x600x350	860x600x460
	Subtractive Mode XYZ Travel (mm)	860x600x350	NA
	Table Size Ø (mm)	170	170
	Maximum Workpiece Size Ø, H (mm)	260 x 350	260 x 460
	Maximum Workpiece Weight Horz/Vert (kg)	100 / 50	100 / 50
	Rotary Axis "C" (degrees)	360	360
	Tilt Range "A" axis (+/- degrees)	-15 / +115	-15 / +115
	Trunnion 250 (Optional)	Permanent	Permanent
	Additive Mode XYZ Travel (mm)	598x600x360	860x600x480
	Subtractive Mode XYZ Travel (mm)	860x600x360	NA
Table Size Ø (mm)	250	250	
Maximum Workpiece Size Ø, H (mm)	335x360	335x480	
Maximum Workpiece Weight Horz/Vert (kg)	100 / 75	100 / 75	
Rotary Axis "C" (degrees)	360	360	
Tilt Range "A" axis (degrees)	-30 / +120	-30 / +120	
CNC Controller	Siemens 840D	Siemens 840D	
Touch Probe	Option	Option	
System Approx weight (kg)	5960	5960	
System Dimensions (mm)	4068x2735x2660	4068x2735x2660	
LENS DEPOSITION	CDRH Class 1 Enclosure	Standard	Standard
	Interlocked Front Door Access	Standard	Standard
	Standard Powder Feeders	Up to 4	Up to 4
	Laser Power Standard (W)	500 - 3000	500 -3000
	Closed Loop Process control	Option	Option
	2.5D Tool Path Software	Option	Option
5 Axis Tool Path Software	Option	Option	
MACHINING	Tool Changer	16 Tool Carousel	NA
	Tool Taper	CAT 40	NA
	Spindle (rpm)	8,000	NA
	Spindle Center Distance to Column Surface (mm)	700	NA
	Spindle Nose to Table Surface (mm)	120-730	NA
	Spindle Motor Peak (W)	7000	NA
	Spindle Torque (Nm)	95	NA

ABOUT OPTOMECC

Optomec® is a privately-held, rapidly growing supplier of Additive Manufacturing systems. Optomec's patented Aerosol Jet Systems for printed electronics and LENS 3D Printers for metal components are used by industry to reduce product cost and improve performance. Together, these unique printing solutions work with the broadest spectrum of functional materials, ranging from electronic inks to structural metals and even biological matter. Optomec has more than 300 marquee customers around the world, targeting production applications in the Electronics, Energy, Life Sciences and Aerospace industries. For more information about Optomec, visit <http://www.optomec.com>.



Optomec Inc.
3911 Singer Blvd. NE
Albuquerque, NM 87109 USA

Tel: 505-761-8250
Fax: 505-761-6638
E-mail: sales@optomec.com



LENS[®] 1500 ADDITIVE MANUFACTURING CONTROLLED ATMOSPHERE SYSTEM

Proven Industrial Additive Manufacturing System for Repair, Rework, Modification and Manufacturing

LENS 1500 AM CA is a state-of-the-art Additive Manufacturing system, using advanced alloys to restore the functionality of high value metal components.



Impeller repaired by LENS 1500 AM CA System



LENS 1500 AM CA System

The LENS 1500 AM CA system offers a large 900 x 1500 x 900mm working volume, making it ideal for repair, rework and modification of large industrial components. The LENS 1500 AM CA uses a high-power IPG Fiber Laser to build up structures one layer at a time directly from metal powder. The resulting material has mechanical properties that can be equivalent to or superior than the original component. The 1500 AM CA offers a full range of features, including 5-axis CNC-controlled motion, closed loop controls, and full atmosphere control. These features, backed by Optomec's full application and service support, make the 1500 AM CA the system of choice for industrial additive manufacturing users.

KEY FEATURES

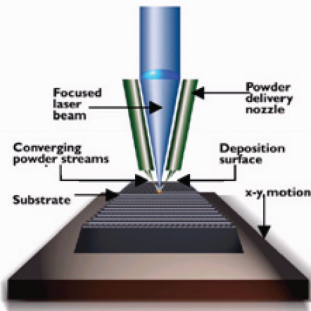
- ▶ Large working volume - ideal for blisks, impellers and shafts
- ▶ 5-axis motion - rotary and complex repairs
- ▶ Closed-loop controls – precision process control
- ▶ Fiber Lasers – reduced cost of ownership
- ▶ Full software suite – generate toolpaths rapidly
- ▶ Full atmosphere control – superior material quality

Common materials: Inconel Alloys, Stainless Steels, Titanium alloys

APPLICATIONS

- ▶ Repair of worn components
- ▶ Rework of mis-machined components
- ▶ Modification of tooling for re-use
- ▶ Hybrid Manufacturing
- ▶ Advanced Product Development

Laser Engineered Net Shaping



LENS® Deposition Head

How the LENS system works:

LENS systems utilize a high-power laser together with powdered metals to build fully dense structures directly from a 3-dimensional CAD solid model. The CAD model is automatically sliced into a tool-path, which instructs the LENS machine how to build the part. The part is constructed layer by layer under the control of software that monitors a variety of parameters to ensure geometric and mechanical integrity.

The LENS process is housed in a chamber which is purged with argon such that the oxygen level stays below 10 parts per million to ensure there is no impurity pick-up during deposition. The metal powder is fed to the process by Optomec's proprietary powder-feed system, which is able to flow small quantities of powder very precisely. When complete, the part is removed and can be heat-treated, Hot-Isostatic Pressed, machined, or finished in any other manner.



Defense Housing
Fabricated by LENS/CNC Process



Compressor Blade
Repaired by LENS System



Exhaust Duct
Fabricated by LENS System

LENS 1500 ADDITIVE MANUFACTURING CONTROLLED ATMOSPHERE SYSTEM

	SPECIFICATIONS	CS 1500 AM CA
AUTOMATION PLATFORM	XYZ Travel (mm)	900x1500x900
	Positional Accuracy (mm)	± 0.186
	Positional Repeatability (mm)	± 0.005
	Tilt Rotate Table	Standard
	Maximum Workpiece Size Ø, H (mm)	610x508
	Maximum Workpiece Weight "C" Orientation (kg)	1427
	Maximum Workpiece Moment "Vertical" Orientation (Nm)	3920
	Rotary axis "C" (degrees)	360
	Tilt range "A" axis (+/- degrees)	± 90
	CNC Controller	Siemens 840D
System Approx Weight (kg)	2900	
System Dimensions (mm)	2700x2700x2700	
LENS DEPOSITION	CDRH Class 1 Air Tight Enclosure	Standard
	Antechamber Ø (mm)	375
	Pneuma Seal Door with Glove Access	Standard/4 Glove Ports
	Oxygen/Moisture Level (ppm)	<10
	Gas Purification and Recirculation System	Standard
	Standard Powder Feeders	Up to 4
	Laser Power Standard (W)	1000 - 3000
	Closed Loop Process Control	Option
	Thermal Imaging Pyrometer	Option
	2.5D Tool Path Software	Option
5 Axis Tool Path Software	Option	

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