Fusion UV® / NobleLight® / OmniCure® / *Phoseon®*

UV Curing Technology Portfolio

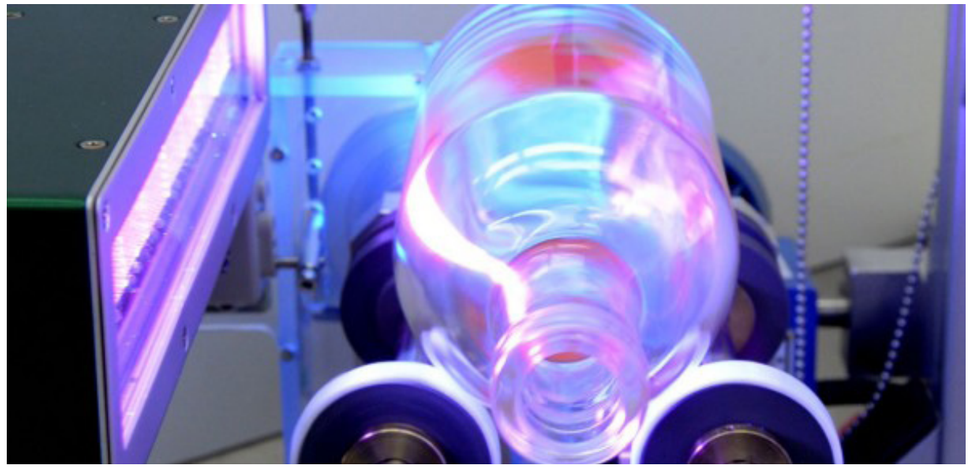
Enabling **the future**
excelitas.com

excelitas®

UV light enables the world around us

Are you aware of how often you benefit from UV light in your day-to-day life? When ultraviolet light is mentioned, many people immediately think of natural sunlight, but UV light is also used in many applications.

Ultraviolet curing is a photochemical process in which UV formulations such as inks, coatings or adhesives are instantly cured when exposed to high intensity UV energy of a specific wavelength. Unlike traditional solvent based formulations, UV curable materials are 100% solid with no VOC's making them safer for the environment, and with process reaction time measured in seconds as opposed to hours, result in higher production throughput.



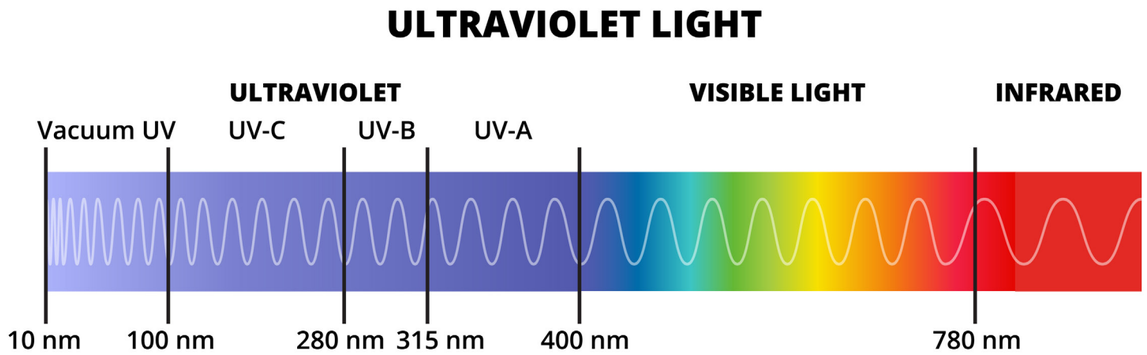
The process used for curing the UV formulations has a significant effect on the physical properties of the cured material, so the equipment used for curing is critical to the outcome of the final product.

Excelitas develops UV light technologies that are integrated into equipment and manufacturing processes, serving markets that shape the future. Our well-recognized brands—including Fusion UV®, NobleLight®, OmniCure® and Phoseon®—offer our customers a full spectrum of UV curing products or fully customized solutions, with global application and technical support to insure their success.

How do I Determine my UV Curing Process?

There are three key parameters of a UV curing process that should be understood for the purposes of optimizing cure and establishing a process window. Identifying this process window will result in the most durable and desirable finish, as well as acceptable adhesion and surface cure.

Spectral Output describes the radiant output across different wavelengths in a light source. For UV curing it is critical that the spectral output of the light source matches the spectral absorption of the photoinitiator of the formulation to be cured. The chemical reaction will only start when sufficient energy of the correct wavelength is absorbed by the photoinitiator. Traditional UV lamps such as microwave or medium pressure mercury produce a broad spectrum of light making them very flexible for curing almost any UV formulation. Newer LED curing sources have a very narrow spectral output which can be produced at specific wavelengths such as 365nm, 385nm or 405nm, but additional care must be taken to insure the photoinitiator of the formulation is matching with the output of the LED source.



Peak irradiance, also called intensity, is the radiant power arriving at a surface (substrate) per-unit area. Irradiance is expressed in units of watts or milliwatts per square centimeter (W/cm^2 or mW/cm^2). Peak irradiance, instrumental in the process speed and physical properties of the cured material, is controlled by the output of the engineered light source, and the distance of the source from the cure surface. The irradiance for UV sources at the cure surface decreases quickly as the distance increases, however, the use of reflectors or optics to concentrate or focus the rays in a tighter surface can be used to improve peak irradiance.

Energy density, also called dose or radiant energy density, is the energy arriving at a surface per-unit-area during a defined period of time (dwell or exposure). A square centimeter is again the unit area and radiant energy density is expressed in units of joules or millijoules per square centimeter (J/cm^2 or mJ/cm^2). Energy density is the integral of irradiance over time. A sufficient amount of energy density is necessary for full cure, however the specific combination of irradiance and time used to achieve the energy density is critical to achieve the desired properties of the cured material.

UV curing applications

The infinite possibilities of UV

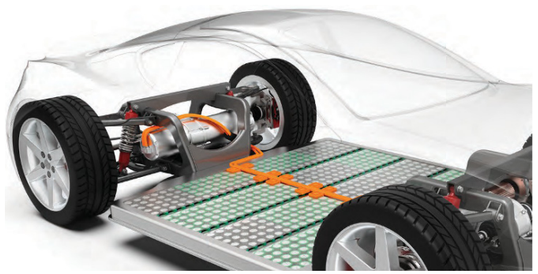
By maximizing UV energy across relevant wavelengths, Excelitas provides UV curing solutions to a wide range of applications. Our extensive portfolio of products come in a variety of sizes and specifications to match your application needs.

Offering the most advanced, simple to use and reliable UV curing technology, Excelitas products are successfully curing inks, coatings, and adhesives for leading manufacturers in demanding applications worldwide.

Automotive

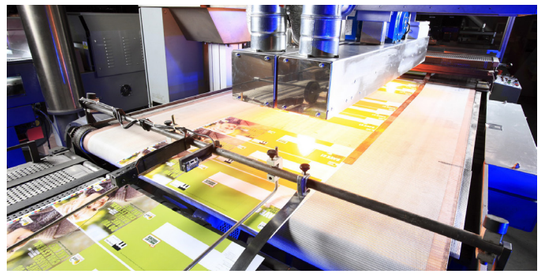
- Protective surface coatings
- Adhesive bonding of parts
- Printing on parts

Battery Manufacturing



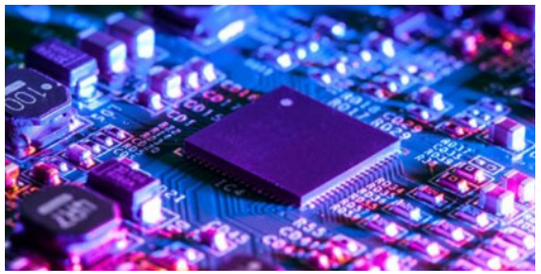
- Bonding Li-ion batteries into cases or modules
- Li-ion battery polymer electrolytes
- Protective coatings

Printing & Packaging



- Digital inkjet, screen, flexo, offset, 3D
- Labels and packaging
- Bottle and tube decorating

Electronics



- Protective coatings
- Electronic potting compounds
- Marking parts and boards

Building Materials

- Wood, metal, glass, plastic coatings
- Adhesive bonding of materials
- UV curing 3D parts

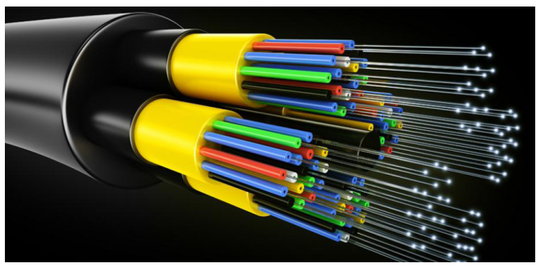
Medical

- Adhesive bonding of medical devices
- Medical device coatings
- Printing on tubes and labels

Functional Films

- Anti-fog and anti-soil coating
- Reflective film
- Release coating

Fiber & Cable



- Coatings
- Adhesive bonding of fibers
- Printing on wire/cable

The full spectrum of UV curing solutions

UV LED spot curing systems

UV LED spot curing systems are ideal for precision adhesive spot curing applications.

*Custom Engineering Solutions Available

OmniCure®

Adhesive spot curing for electronics, medical device and opto-electronics assemblies.

UV LED air-cooled systems

Air-cooled UV LED curing systems allow for easy and cost-effective integration into automated systems without the need for a separate chiller.

*Custom Engineering Solutions Available

Phoseon®
OmniCure®

Labels and packaging, container decoration, digital printing, wire and fiber coatings, electronics, automotive assembly, medical devices, wood furniture and others.

UV LED water-cooled systems

Water-cooled UV LED curing systems for environments with extreme temperatures and debris. Ideal for heat-sensitive substrates.

*Custom Engineering Solutions Available

Phoseon®
NobleLight®

Labels and packaging, container decoration, digital printing, wire and fiber coatings, electronics, automotive assembly, medical devices, wood furniture, and others.

UV spot curing systems

UV lamp spot curing systems are ideal for precision adhesive spot curing applications. Ideal for broad spectrum applications.

*Custom Engineering Solutions Available

OmniCure®

Adhesive spot curing for electronics, medical device and opto-electronics assemblies.

Microwave UV curing systems

Microwave UV curing systems use electrodeless bulbs offering longer life, consistent output and less heat compared to mercury arc UV. Ideal for broad spectrum, high power and UVC applications.

*Custom Engineering Solutions Available

Fusion UV®

Adhesive bonding, automotive components, converting web coatings, metal decorating, glass decorating, medical device, electronic component, plastic decorating, fiber coating.

Mercury arc lamps

Noblelight® Amba® UV curing medium pressure mercury arc lamps are broad spectrum and come in various lengths and power classes. Ideal for use as replacement lamps.

*Custom Engineering Solutions Available

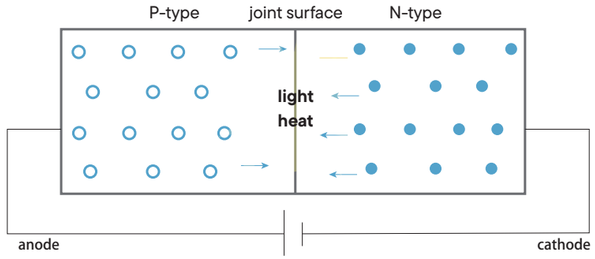
NobleLight®

Replacement lamps for printing, wood coating, and many other UV curing processes.

UV LED curing systems

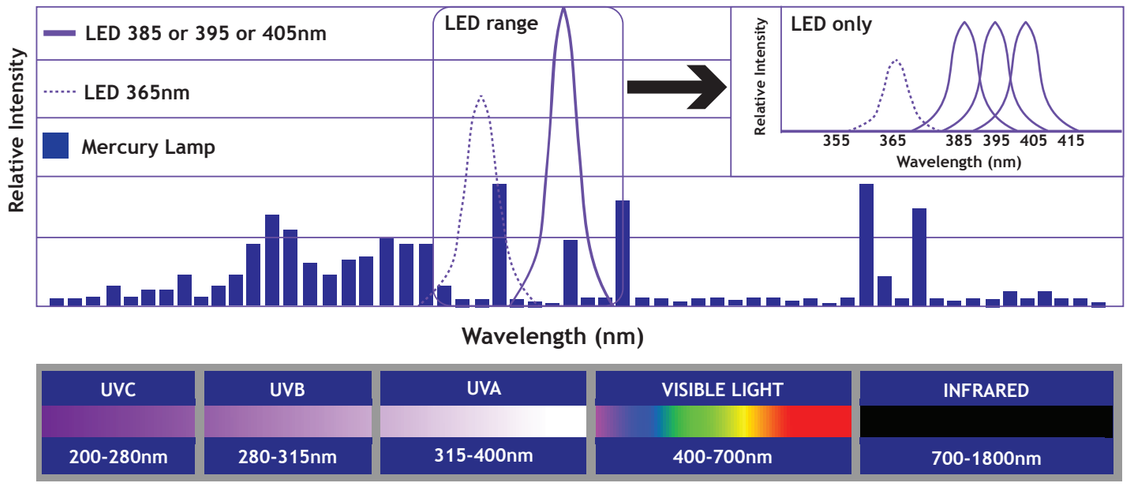
Patented technology provides high-performance UV curing

LEDs are widely used in UV curing because the benefits are significant. UV LED curing technology is progressing at a remarkable speed, and in many cases, replacing conventional UV lamps due to their many advantages such as low power consumption, fast response time when turning on and off, long life, no infrared heat from the light source, and no ozone generation.



The light emitting element of a UV LED is a semiconductor, and the wavelength is determined by the band gap energy difference of the semiconductor material used. UV LEDs currently on the market use blue LED light emitting technology and are derived from the gallium nitride (GaN) system.

UV LED curing systems have a narrow spectral output centered around a specific wavelength, ±10nm. Most products use 365nm, 385nm, 395nm or 405nm wavelengths. This near-monochromatic distribution (see chart) requires new chemical formulations to ensure proper curing of inks, coatings and adhesives.



Semiconductor Light Matrix (SLM)™ Technology

Patented Semiconductor Light Matrix (SLM)™ technology from Excelitas encapsulates LEDs, Arrays, Optics and Cooling to maximize UV LED curing performance. Each of these four components are strictly engineered into a system that provides maximum UV energy and superior performance while also increasing long-term robustness for demanding applications.

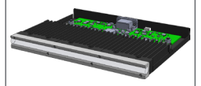
Air-Cooled UV LED Curing Systems

Excelitas high-performance, air-cooled UV LED curing systems deliver high peak irradiance and dosage for rapid curing in a variety of applications. These systems are designed with high-power LEDs available in multiple wavelengths to suit specific needs. Their efficient air-cooling mechanism ensures long lifespans and reduced power consumption. UV LED curing systems are available in various sizes and are scalable to meet custom and flexible curing area requirements. This design allows for easy and cost-effective integration into automated systems without the need for a separate chiller.

Water-Cooled UV LED Area Curing Systems

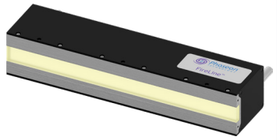
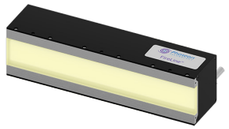
Excelitas high-performance, water-cooled UV curing systems are built to be durable and dependable, making them suitable for even the most challenging environments with extreme temperatures and debris. Additionally, these water-cooled light sources operate quietly, making them an excellent choice for situations where low noise is a priority.

Phoseon® air-cooled UV LED curing systems

	 **FireEdge™ FE100**	 **FireEdge™ FE410**		 **FireJet™ FJ100**	
Wavelength (nm)	385/395/405	365	385/395/405	365	385/395/405
Peak Irradiance (W/cm^2)	2	6	10	8	8 / 12 / 16
Cooling method	Air-cooled				
Emitting Window (mm)	80 × 10 120 × 10 180 × 10 240 × 10	80 × 10 120 × 10 160 × 10 180 × 10 240 × 10		75 × 20 150 × 20 225 × 20 300 × 20 375 × 20	
DC48V input (W/A) @ Peak Irradiance	80 : 34W/0.7A 120: 50W/1.1A 180: 75W/1.6A 240: 100W/2.1A	80: 143W/3.0A 120: 227W/4.7A 160: 269W/5.6A 180: 322W/6.7A 240: 432W/9.0A	80: 201W/4.2A 120: 280W/5.8A 160: 385W/8.0A 180: 401W/8.4A 240: 502W/10.5A	75: 288W/6A 150: 720W/15A 225: 960W/20A 300: 1296W/27A 375: 1632W/34A	75: 576W/12A 150: 1104W/23A 225: 1632W/34A 300: 2160W/45A 375: 2640W/55A
Dimensions (mm, L × W × H)	80: 81.3 x16 × 38 120: 121.4x16 × 38 180: 181.6x16 × 38 240: 241.8x16 × 38	FLAT Lens 80: 81.6 × 124.2 × 31.5 120: 121.6 × 124.2 × 31.5 160: 161.6 × 124.2 × 31.5 180: 181.6 × 124.2 × 31.5 240: 241.6 × 124.2 × 31.5 ROD Lens 80: 81.6 × 130.0 × 31.5 120: 121.6 × 130.0 × 31.5 160: 161.6 × 130.0 × 31.5 180: 181.6 × 130.0 × 31.5 240: 241.6 × 130.0 × 31.5		75: 76.8 × 52 × 147 150: 152.3 × 52 × 147 225: 227.8 × 52 × 147 300: 303.2 × 52 × 147 375: 378.6 × 52 × 147	
Weight (Kg)	80: 0.2 120: 0.3 180: 0.4 240: 0.5	FLAT Lens 80: 0.28 120: 0.36 160: 0.5 180: 0.56 240: 0.7 ROD Lens 80: 0.31 120: 0.42 160: 0.58 180: 0.64 240: 0.8		75: 0.5 150: 1.0 225: 1.5 300: 2.0 375: 2.5	

	 **FireJet™ ONE**		 **FireJet™ FJ240**		 **FireJet™ FJ801**	
Wavelength (nm)	365	385/395/405	365	385/395/405	365	385/395/405
Peak Irradiance (W/cm^2)	12	20	8	12/16	1.2	1.7
Cooling method	Air-cooled					
Emitting Window (mm)	75 × 20 150 × 20 225 × 20 300 × 20 375 × 20		75 × 40 150 × 40 225 × 40 300 × 40 375 × 40		100 × 100	
DC48V input (W/A) @ Peak Irradiance	75: 600W/12.5A 150: 1200W/25A 225: 1800W/37.5A 300: 2400W/50A 375: 3000W/62.5A	75: 672W/14A 150: 1344W/28A 225: 2016W/42A 300: 2688W/56A 375: 3360W/70A	75: 720W/15A 150: 1440W/30A 225: 2160W/45A 300: 2880W/60A 375: 3600W/75A	75: 1008W/21A 150: 2016W/42A 225: 3024W/63A 300: 4032W/84A 375: 5040W/105A	Separate controller required: AC 115V / 16A or AC 230V / 10A	
Dimensions (mm, L × W × H)	75: 76.8 × 52 × 147 150: 152.3 × 52 × 147 225: 227.8 × 52 × 147 300: 303.2 × 52 × 147 375: 378.6 × 52.0 × 147		75: 77 × 136 × 249 150: 152 × 136 × 249 225: 228 × 136 × 249 300: 303 × 136 × 249 375: 379 × 136 × 249		110 × 110 × 193 Separate controller: 362 × 139 × 217	
Weight (Kg)	75: 0.5 150: 1.0 225: 1.5 300: 2.0 375: 2.5		75: 1.3 150: 2.2 225: 3.2 300: 4.2 375: 5.2		1.4 Separate controller: 3.6	

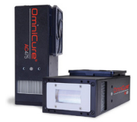
Phoseon® water-cooled UV LED curing systems

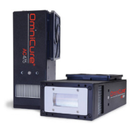
	 **FireLine™ FL200**		 **FireLine™ FL400**		 **FireLine™ FL440**	
Wavelength (nm)	365	385/395/405	365	385/395/405	365	385/395/405
Peak Irradiance (W/cm^2)	10	25	12	12/16/20/24	12	16
Cooling method	Water-cooled					
Emitting Window (mm)	75 × 10 125 × 10		125 × 20 150 × 20 225 × 20 250 × 20 300 × 20		150 × 40 225 × 40 250 × 40 300 × 40	
DC48V input (W/A) @ Peak Irradiance	75: 290W/6.0A 125: 480W/10.0A	75: 432W/9.0A 125: 720W/15A	125: 909W/19A 150: 1090W/23A 225: 1635W/34A 250: 1817W/38A 300: 2180W/45A	125: 1604W/33A 150: 1925W/40A 225: 2888W/60A 250: 3209W/67A 300: 3850W/80A	150: 1670W/42A 225: 2504W/63A 250: 2743W/69A 300: 3340W/84A	150: 1920W/40A 225: 2880W/60A 250: 3200W/67A 300: 3840W/85A
	The FireLine FL200 Controller is required for power input.					
Dimensions (mm, L × W × H)	75: 76 × 25 × 56.21 125: 126 x 25 × 56.21		125: 127 × 58 × 72 150: 152 × 58 × 72 225: 227 × 58 × 72 250: 252 × 58 × 72 300: 302 × 58 × 72		150: 152 × 80.6 × 72 225: 227 × 80.6 × 72 250: 252 × 80.6 × 72 300: 302 × 80.6 × 72	
Weight (Kg)	75: 0.26 125: 0.38		125: 1.1 150: 1.2 225: 1.8 250: 2.0 300: 2.3		150: 1.6 225: 2.4 250: 2.6 300: 3.0	

	 **VeriCure™**	 **Nexus One™**	
Wavelength (nm)	395 (365 & 405 also available)	395	
Peak Irradiance (W/cm^2)	20	65W UV power per segment	90W UV power per segment
Cooling method	Water-cooled	Air-cooled	Water-cooled
Emitting Window (mm)	1350 × 20	300 × 50 375 × 50 450 × 50 525 × 50 600 × 50	300 × 50 375 × 50 450 × 50 525 × 50 600 × 50 675 × 50
DC48V input (W/A)@ Peak Irradiance	13 kW/110A	300: 2040W/17A 375: 2600W/22A 450: 3200W/27A 525: 3960W/33A 600: 4560W/38A *AC120V	300: 2900W/24A 375: 3575W/30A 450: 4300W/36A 525: 5000W/42A 600: 5700W/48A 675: 6400W/54A *AC120V
Dimensions (mm, L × W × H)	1624 × 104 × 155	598 × 112 × 147 680 × 112 × 147 748 × 112 × 147 823 × 112 × 147 898 × 112 × 147	620 × 112 × 147 695 × 112 × 147 770 × 112 × 147 845 × 112 × 147 920 × 112 × 147 992 × 112 × 147
Weight (Kg)	29	300: 7 375: 9 450: 11 525: 13 600: 15	300: 9 375: 11 450: 12.5 525: 14 600: 15 675: 16

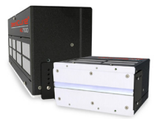
OmniCure® UV LED area curing systems

OmniCure's UV LEDs are extremely reliable and have a longer lifespan than other UV LEDs. In the production lines of our customers, the LEDs have been operating without problems for over 50,000 hours.

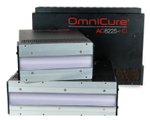




	AC275		AC2110		AC450/450P		AC475/475P		AC550/550P	AC575/575P
Wavelength (nm)	365	395	365	395	365	395	365	395	395/405*	
Peak irradiance (W/cm²) D = 1 mm	3.4	4.1	3.4	4.1	8	8.2	3	4	14	14/12.5* *AC575-405 only
Cooling method	Air-cooled									
Emitting Window (mm)	76 × 10		114 × 10		50 × 25		75 × 25		50 × 25	75 × 25
DC48V input (W)	92		134		330		480		123	184
Dimensions (mm, L × W × H)	79 × 29 × 129		117 × 29 × 129		110 × 68 × 190		110 × 68 × 190		110 × 68 × 190	
Weight (Kg)	0.28		0.44		1.1		1.1		1.1	1.1



	AC7150		AC7300		AC8150		AC8225		AC8300	
Wavelength (nm)	365	395	365	395	365	395	365	395	365	395
Peak irradiance (W/cm²) D = 1 mm	3	5	3	5	8	8.5	8	8.5	8	8.5
Cooling method	Air-cooled									
Emitting Window (mm)	152 × 15		305 × 15		150 × 25		225 × 25		300 × 25	
DC48V input (W)	330		650		956		1430		1904	
Dimensions (mm, L × W × H)	152 × 100 × 148		305 × 100 × 148		159 × 80 × 218		235 × 80 × 218		311 × 80 × 218	
Weight (Kg)	1.8		3.2		3.6	2.5	4.4	2.7	5.2	2.9



	AC8150P-HD	AC8225P-HD	AC8300P-HD	AC9150/ AC9150P	AC9225/ AC9225P	AC9300/ AC9300P	AC8225-F+** **For fiber curing	AC9225-F** **For fiber curing
Wavelength (nm)	385 / 395 / 405			395			395	
Peak irradiance (W/cm²) D = 1 mm	15.1	15.1	15.1	14	14	14	16.3* *WD = 10 mm	21.8* *WD = 10 mm
Cooling method	Air-cooled							
Emitting Window (mm)	150 × 30	225 × 30	300 × 30	150 × 25	225 × 25	300 × 25	225 × 15	
DC48V input (W)	650W	975W	1300W	1058W	1587W	2116W	600W	900W
Dimensions (mm, L × W × H)	159 × 80 × 218	235 × 80 × 218	311 × 80 × 218	159 × 80 × 218	235 × 80 × 218	311 × 80 × 218	235 × 80 × 220	
Weight (Kg)	2.8	3.7	5.2	1.8	2.7	3.6	2.7	

OmniCure® UV spot curing curing systems

OmniCure® spot curing systems are available in UV lamp and UV LED types.

	S1500 Pro	S2000 Elite	LX500 / LX505
Irradiance	Spot		Area
Lamp	200W high pressure mercury Short arc lamp		LED (V3 LED head)
Number of channels			2 or 4
LED head (mm)			55 / 130
Lamp life (hours)	2000	2000	
Power, maximum (W/cm²)	37		365 nm: 16.8 385 nm: 27.3 395 nm: 27.0 405 nm: 23.8
Usable filters (nm)	No filter 250~400, 320~390, 320~500, 365, 400~500	No filter 250~400, 320~390, 320~500, 365, 400~500	365/385/395/405
Warm-up time (min)	4 (minimum)	4 (minimum)	
Power supply	AC100-240, 50/60Hz	AC100-240, 50/60Hz	AC100-240, 50/60Hz
Dimensions (mm, L × W × H)	289 × 139 × 268	289 × 139 × 268	139.7 × 88.9 × 139.7
Weight (Kg)	5	5	5

Noblelight® Semray® UV LED curing systems

The ideal UV light source for short delivery times and higher quality printing, especially at large working distances, resulting in less quality claims especially for online print shops and overnight deliveries.

Noblelight® Semray® 5000+ technical data

Peak wavelength (nm)	385
Irradiation intensity (W/cm²)*	6.5
Irradiation intensity at 50 mm working distance	16
Emission window size (mm)**	X × 82
Outer dimensions of housing (mm)***	X (W) × 100 (D) × 100 (H)

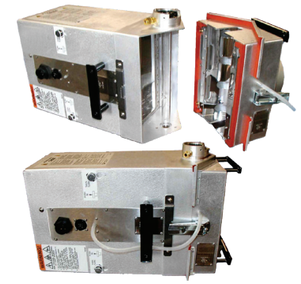
* At emission window.
** Emission window size scalable in width from 400 to 1300 mm in 50 mm steps.
*** Outer dimensions of housing scalable in width from 415 to 1315 mm in 50 mm steps.

Noblelight® Semray 5000+ features

- Highest output at 60 mm distance increases the printing speed dramatically
- Ozone and VOC-free technology requires no airflow section, which saves energy and space for blowers and additional pipework
- Powderless, no smear-off in the delivery stack saves costs and cleaning time
- Instant On/Off in milliseconds and possible pulsing saves more than 10% of lamp energy
- Symmetrical switch off for smaller paper formats, half the paper size results in 50% of lamp energy savings
- No spare parts are required reducing maintenance costs
- Less heat transfer to heat-sensitive materials such as plastics
- Stable UV LED system operation reduces maintenance expenditures
- Immediate results allow fast turnover time from printing to delivery

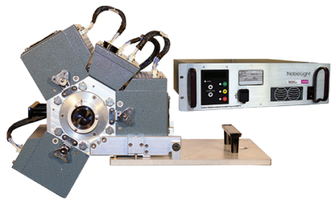
Fiber optic curing systems

Excelitas offers four types of fiber optic UV curing lamps:



Fusion UV® Microwave UV curing systems

The I250 DRF Microwave UV curing systems are used in fiber optic and cable manufacturing for photoreactive coatings, coloring inks, and matrix polymers for ribbons. The 6” or 10” modular UV lamp design allows for flexible lamp placement in draw towers, coloring lines, coating systems, and wire and cable manufacturing lines. The modular design allows for ease of maintenance and replacement as well as control flexibility.



Noblelight® Semray® UV LED curing systems

The Noblelight® Semray® UV PC6003 UV LED curing system is designed from the ground up for fiber optic drawing and coloring manufacturing processes. It scales with production speeds, reduces downtime, and lowers total cost of ownership. It also makes retrofitting existing draw towers and other fiber and cable manufacturing lines easy and cost-effective.

Phoseon® UV LED Curing Systems

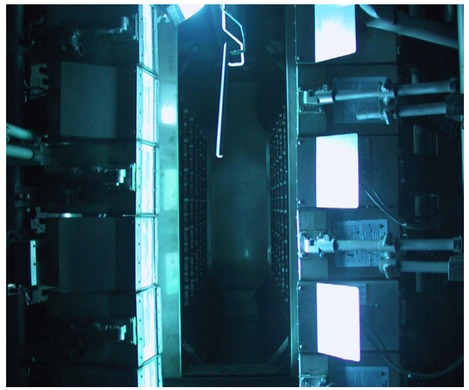
Phoseon® fiber curing systems feature an improved airflow design for enhanced internal cooling and reduced fan noise. Integrated mounting hardware makes retrofitting to existing towers easier than ever. Field-proven, fiber-optimized UV LED sources and patented focusing reflectors focus UV light energy into a narrow cylinder at the fiber lead for maximum cure at top speeds.

OmniCure® UV LED Curing Systems

The OmniCure AC8225-F+ and AC9225-F UV LED curing systems are specifically designed for fiber optic curing applications. They feature a custom optical design that enhances power and optimizes UV curing for fiber optics, providing an air-cooled, high-power solution to meet market demands for increased process speeds.

Microwave UV curing systems

A reliable and flexible solution delivering high production rates and product quality



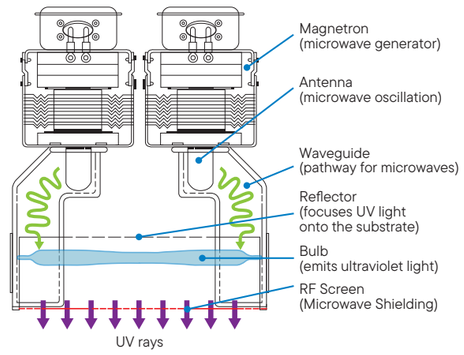
Fusion UV Microwave UV curing systems uses the same microwave (2,450MHz) energy as that used in microwave ovens, and does not have the metal electrodes found in conventional arc lamps. As a result these systems provide more consistent light output, longer operating life and less heat onto the substrate.

The microwave energy excites luminescent materials, such as mercury inside the bulb, which produces light energy. Choosing the bulb type with the UV spectral output that best matches the absorptivity of the UV formulation results in more efficient UV curing process.

The modular lamp systems are available in 6-inch or 10-inch widths. For wide width applications, place modules side-by-side across the width for output uniformity. Save energy with the control flexibility to turn off individual modules for narrower width curing when needed.

Advantages of electrodeless lamps

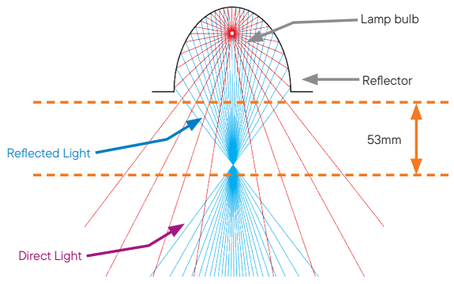
1.	High output	UV light emission efficiency and high illuminance
2.	Output stability	Initial UV output degrades very little
3.	Low heat	Infrared heat is about 60% of that of arc lamps
4.	Long life	Bulb life is 6,000 to 8,000 hours, 5 to 10 times longer than mercury arc lamps
5.	Various UV wavelengths	UV wavelengths (H, D, V, H+) Bulb changes are quick and easy
6.	Instant On/Off	Can be turned On and Off instantly No need for mechanical shutters



Bulb with reflector

Bulb and reflector our housed in the lamp module. The elliptical reflector has a very high reflection efficiency and concentrates the maximum amount of UV energy on the substrate. The peak UV intensity is 53mm from the face of the lamp module.

In addition, the small diameter of the bulb helps reduce IR heat onto the substrate. As a result heat-sensitive substrates are not damaged during curing.



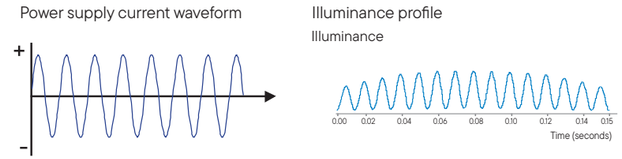
LightHammer® DC power microwave UV curing systems

The LightHammer® Series of smart UV curing systems is our most advanced microwave-powered system, incorporating solid-state power supplies and internal sensors to monitor real-time system performance. Solid-state power supplies reduce energy costs and provide simple and flexible control schemes via software versus traditional hardware. User benefits include reduced operating costs, simple and flexible controls and reduced downtime.

Power supply current waveforms and their light emission behavior for electrode and electrodeless lamps

Arc lamps that operate on AC current and electrodeless lamps that are driven by full-wave rectification are affected by AC current and emit light like a pulsed light source. This light emission behavior is thought to be caused by the power supply current waveform.

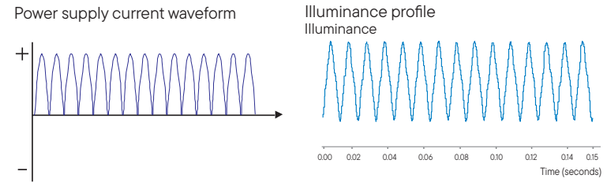
Arc lamp (alternating current)



Pulsed light irradiation alternates between luminescent and dark regions. In the dark regions, there are periods when no excited species are generated from the photoinitiator by UV irradiation, and only propagation and termination reactions occur. In the luminescent regions that follow the dark regions, low molecular weight radicals are generated by cleavage of the initiator.

The generation of these low molecular weight radicals leads to “premature” termination reactions, which leads to an increase in microgels in the early stages of curing. This leads to the uneven size of the crosslinked regions.

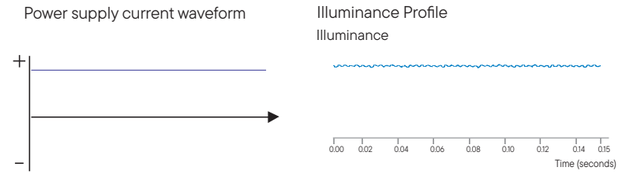
Electrodeless lamp (full wave rectification)



On the other hand, under steady-state light emission behavior from a DC current-driven light source, initiation, propagation, and termination reactions occur during UV irradiation. A steady state with a constant radical concentration is formed, and normal termination reactions increase, resulting in a higher uniformity of the crosslinked region.

These differences in light emission behavior from UV irradiation light sources have a significant impact on the photoinitiator generation process, the microdomain structure of the cured product, and the uniformity of the crosslinked region.

Electrodeless lamp (DC) LightHammer® series



Going forward, DC-driven lamps are expected to continue to contribute to the creation of highly functional materials using UV curing technology.

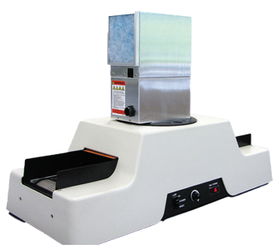
Fusion UV® Microwave UV Curing Systems

10 inch Fusion UV® Microwave UV curing systems

	LightHammer® 10 Mark II	F600 series
Lamp type	DC power supply	Full wave rectification (high power)
Intelligent built-in sensor	Power Supply	None
Lamp bulb type	H, D, V, H+	H, D, V, H+
Light start time	15 seconds (from reset) Immediate (from standby)	15 seconds (from reset) 5 seconds (from standby)
Reflector structure	Oval (concentrated)	Oval (concentrated)
Optimal focal length	5.3 cm (2.1 inches)	5.3 cm (2.1 inches)
Dichroic reflector (IR reduction)	Optional	Optional
Lamp output (at 100%)	240 W/cm (600 W/inch)	240 W/cm (600 W/inch)
Output level	Power output range: 35-100% (1% increments)	100% or 60% two-stage switching
Shutter mechanism	Mechanical (optional)	Mechanical (optional)
External control	Voltage-free contacts	Voltage-free contacts
Communication	DeviceNet™, Profibus®, EtherNet/IPTM, ProfiNet	Discrete I/O contacts
Cooling blower	Remote type*3 (blower integrated type available)	Remote type*3 only
Airflow required for amp cooling	8.9 m^3/min (315 cfm)	8.9 m3/min (315 cfm)
Lamp footprint (mm)	206 × 267	206 × 267
Compliance	CE, TUV, UL	CE, TUV, UL, CAN/CSA

*1: Varies depending on duty cycle and power level.
*2: Duty cycle ratio varies depending on conditions.
*3: For remote type, customer must provide blower.

6 inch benchtop conveyor LC6B



Effective width	152mm (6 inches)
Entrance/exit opening height	Maximum 76mm
Lamp arrangement	360 degree rotation Up and down adjustment possible up to 100mm from the focal point on the belt surface
Device size	Length: 1070 mm Width: 510 mm Height: 310 mm without light source lamp, 695 mm with light source lamp (F300S)
Weight (without lamp)	25 kg

6 inch Fusion UV® Microwave UV curing systems

	LightHammer®6 Mark II	F300 series
Lamp type	DC power supply	Full-wave rectification
Intelligent built-in sensor	Power Supply	None
Lamp bulb type	H, D, V	H, D, V, H+
Light start time	15 seconds (from reset state) Immediate (from standby state)*1	20 seconds (from reset) 5 seconds (from standby)
Reflector structure	Oval (concentrated type)	Oval (concentrated)
Optimal focal length	5.3 cm (2.1 inches)	5.3 cm (2.1 inches)
Dichroic reflector (IR reduction)	Optional	Optional
Lamp output (at 100%)	200 W/cm (500 W/inch)	120 W/cm (300 W/inch)
Output level	Power output range: 35-100% (in 1% increments)	100%
Shutter mechanism	On/Low Power Output “simmer mode” cycle function *2	Mechanical (optional)
External control	Voltage-free contacts	Voltage-free contacts
Communication	DeviceNet™, Profibus®, EtherNet/IPTM, ProfiNet	Discrete I/O contacts
Cooling blower	Blower integrated type, remote type*3	Blower integrated type, remote type*3
Airflow required for lamp cooling	3.7 m3/min (132 cfm)	2.7 m^3/min (100 cfm)
Lamp footprint (mm)	168 × 168	208 × 168
Compliance	CE, TUV, UL	CE, TUV

Belt and conveying direction	Belt: Teflon®-coated meshed Kevlar® fiber, Conveying direction: Standard type, from right to left when viewed from the operating side
Speed indicator	Digital display (ft./min. or m/min.)
Conveying speed	4 types to choose from (0.6 ~ 2.2 m/min, 1 ~ 7.0 m/min, 5 ~ 23 m/min, 15 ~ 76 m/min)
Drive method	MDC gear motor, timing belt drive (cog belt drive) 2 speed ranges available by replacing the pulley for each model
Control	Power ON/OFF, speed adjustment, lamp ON/OFF
Interconnection	Lamp ON/OFF (turns off when belt stops)
Exhaust blower	Built-in type*1, Remote type
Power supply	Single phase 117/230VAC, 50/60Hz, internal switching type, power switch connection or IEC method

*1: Built-in exhaust blower is for Laboratory usage only. Production enviroment requires external blower.

Noblelight® Amba® medium pressure UV lamps

Producing the widest range of UV curing lamps as well as metal halide UV lamps and components available, Noblelight can supply Amba® replacement UV lamps for a wide range of UV curing applications. For special OEM designs, we provide in-depth technical consulting and in-house test facilities.

Features of Excelitas' medium pressure UV lamps

- Over 10,000 types of lamps
- Maintains high output until the lamp reaches the end of its life, enabling efficient UV curing processes
- Uses sealing materials, high-purity quartz glass, electrode materials, and connectors to achieve high performance
- We create custom-made lamps to meet your needs
- We provide replacement lamps for UV system manufacturers

Mercury UV Lamps for UV curing applications

Mercury lamps are the most commonly used lamps for UV curing applications. Excelitas Noblelight Amba products are available in arc lengths from 12mm up to 3.9m. With our own flexible production lines, we are able to manufacture the most commonly used lamp types.

Arc Length
From 12 mm
Up to 3.9 m

Metal halide lamps for reprographic and specialty UV curing applications

Metal halide lamps are the most commonly used lamps for reprography and other UV curing applications requiring higher wavelength output. They consist of a mercury lamp filled with gallium, iron, or other metal compounds to modify the lamp's spectral output. Excelitas is your specialist for choosing the best metal halide for your UV curing process. Noblelight Amba metal halide lamps are:

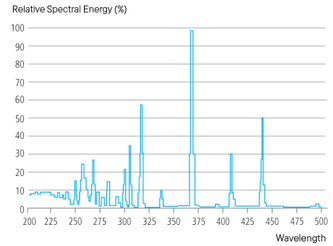
- Long service life
- Short exposure times
- Stability over lamp life
- Reliable ignition

Features

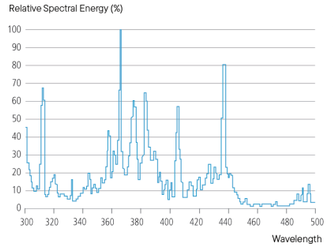
Emission length (mm)	12-3,900
Lamp output (W/cm)	80-400
Emission spectrum (nm)	200-400
Lamp quartz tube surface temperature (°C)	600-800
Life (h)	1000

Medium pressure UV lamp emission spectrum

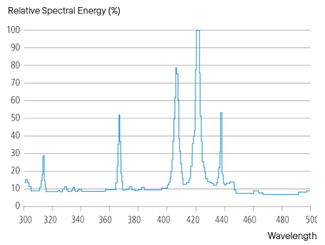
Mercury lamp (Hg)



Metal halide lamp (Fe)

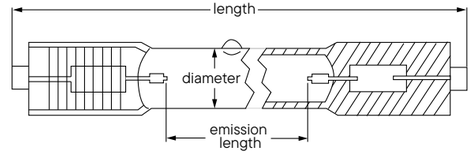


Gallium lamp (Ga)



UV curing lamp portfolio

Lamp output	Illumination length (mm)	Output (W)
Intensity (W/cm)	180-2,500	1,500-20,000
120	250-2,400	3,000-28,800
160	200-1,800	3,200-28,800
200	200-1,400	4,000-28,000



MH lamp lineup

Output (W)	Lamp voltage (V)	Lamp current (A)	Illumination length (mm)	Total length (mm)	Tube diameter (mm)	Connector
250	115	2.7	11	67.5	13.5	R7
250	120	2.4	16	72.6		
400	135	4.3	31	105		
800	125	7.0	60	127	16.3	
1,000	145	8.5	105	174	18.5	

Differences in UV lamp names

Lamp type	Japanese manufacturers	Overseas manufacturers (mainly Europe and the US)	Main Applications
Low pressure mercury	Low pressure mercury lamps (185+254 nm)	Low pressure mercury lamps (185+254 nm) (Low pressure mercury lamps)	Sterilization, surface modification, light cleaning
High pressure	High pressure UV lamps (200-400 nm)	Medium pressure UV lamps (200-400 nm) (Middle pressure UV lamps)	Print drying, resin hardening
Ultra high pressure mercury	Ultra high pressure mercury lamps (365 nm, etc.)	Super high pressure mercury lamps (365 nm, etc.) (Super high pressure mercury lamps)	Exposure for pattern formation on printed circuit boards

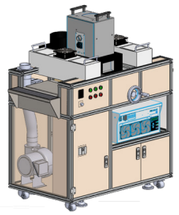
Custom engineering solutions for UV curing

Excelitas provides custom UV curing systems for various processes and applications. Our offerings range from single lamp modules to complete turnkey systems that include multiple lamp modules, light shielding, material handling, and controls. These tailored UV curing solutions are designed to meet specific application requirements, ensuring successful integration into both existing and new production lines.

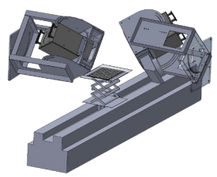
Our experience spans across a variety of applications, such as converting, pipe and tube production, beverage can bottom rim coating, flat line conveyor systems, and curing solutions for three-dimensional parts. We collaborate closely with our customers to develop a UV curing solution that meets their specific requirements, offering options such as nitrogen inerting, water-cooled chill rolls, motorized lift systems, and more.

- Conveyor solutions in different sizes and with different accessories
- Control solutions (Power supply towers up to complex HMI/PLC control systems)
- Nitrogen panels, shutter and light shield designs
- Periphery parts frame profiles, Louver material, housings, etc.

Examples of custom engineering for UV curing



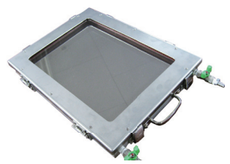
Hybrid (Microwave UV curing systems + infrared heater unit) conveyor example



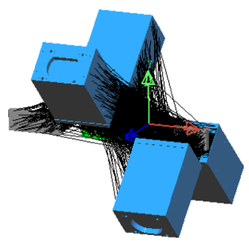
3D-UV Lamp System

Custom Engineered UV Curing System

Nitrogen supply safety device
Nitrogen cylinder required separately



Nitrogen inert box
Large enough to fit A4 sized substrates

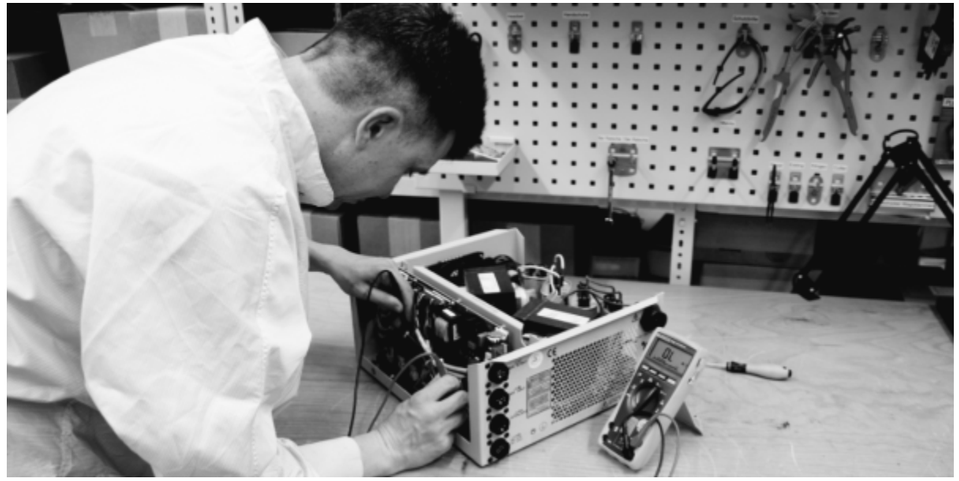


Ray Tracing

Technical services

To avoid long downtimes and get help quickly in case of a problem, our service technicians are there for you at any time. We offer the following technical services:

- Commissioning support
- In-house and on-site repair and inspection
- On-site and remote training
- Spare part consulting
- Preventive maintenance contracts



Advanced Lighting Testing Facilities

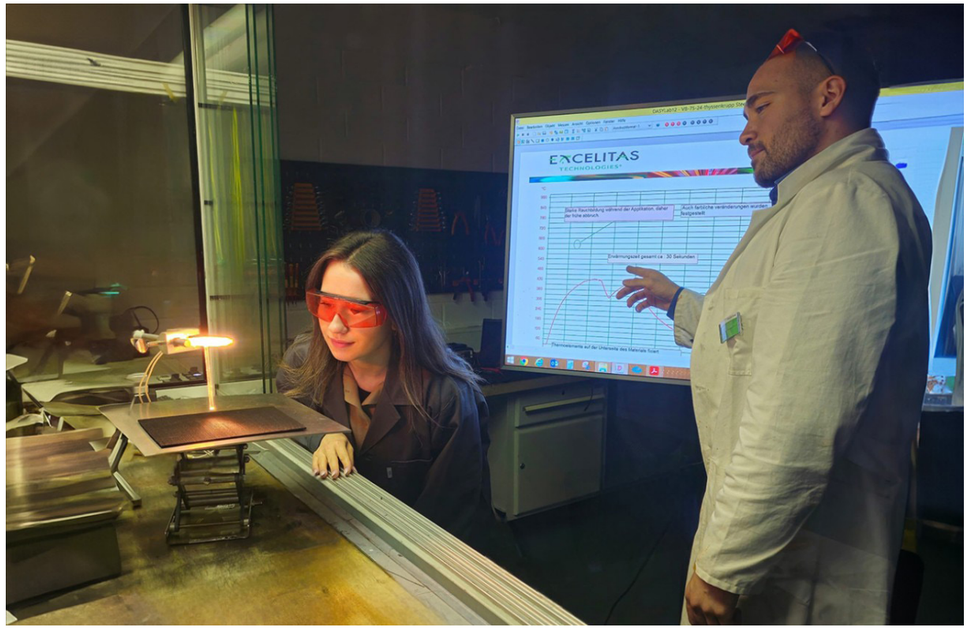
Excelitas runs global application competence centers to intensively test and optimize customer applications. Our experienced teams use their technical expertise and special light sources to develop efficient solutions, even for complex requirements. We carry out projects in co-operation with a wide range of companies, which are implemented directly at the customer's premises after successful validation in the test center. We attach great importance to the protection of confidential information.

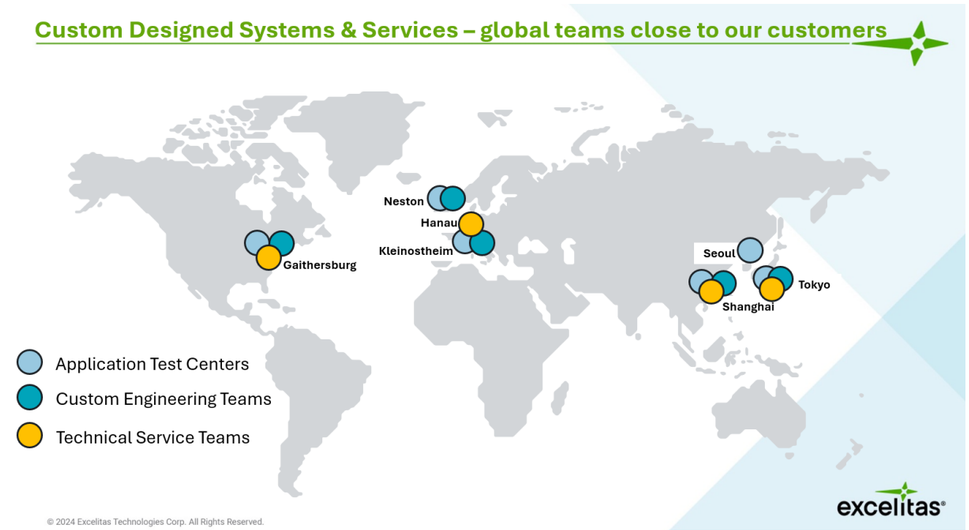
Through our advanced technical expertise and customer-focused collaboration, Excelitas provides customized solutions that effectively support our customers' production goals.

Our advanced testing facilities offer the following services:

- Support with feasibility analyses
- Arranging contacts with formulation experts
- Carrying out laboratory tests
- Tests with equipment either at your site or in our test centers

If you are looking for a partner, Excelitas offers customers the full spectrum of solutions from UV to IR, supporting a wide range of applications. As a single source provider, the Excelitas portfolio includes UV lamps and systems, UV LED spot and area curing systems, UV microwave, Infrared emitters and systems, and medium pressure UV lamps. Contact us if you would like to collaborate.





About Excelitas Technologies

Excelitas is a leader in the global end markets of life sciences, advanced industries, next generation semiconductors and aerospace and defense, delivering advanced technologies that enrich life. Headquartered in Pittsburgh, Pennsylvania, USA, Excelitas is an essential partner in the design, development and manufacturing of photonic technologies, providing cutting-edge innovations in sensing, detection, imaging, optics and specialty lighting to customers worldwide. Excelitas is at the forefront of many relevant megatrends impacting the world today, including precision medicine, industrial automation, artificial intelligence, connected devices (IoT) and military modernization.

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