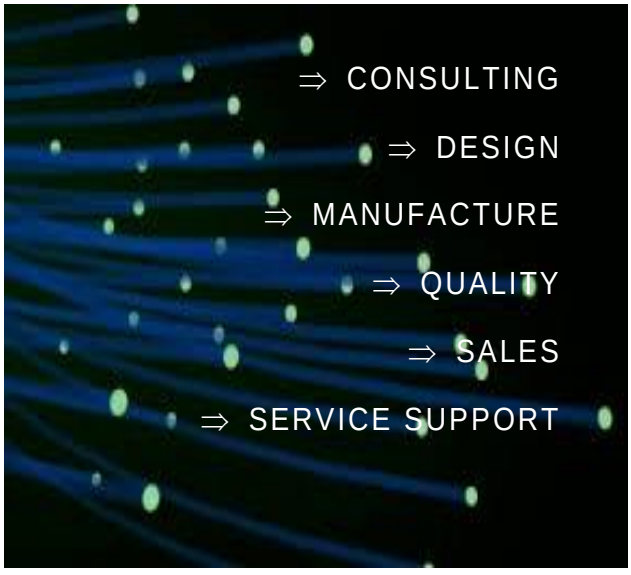
LED UV PRODUCTS AND SOLUTIONS

TruSpectra

Enable Spectrum Productivity

UV LED Product Series

AUTOMOTIVE UV CURING SYSTEMS FOR GLASS/PLASTIC SUBSTRATES



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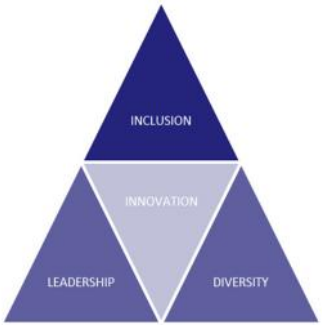
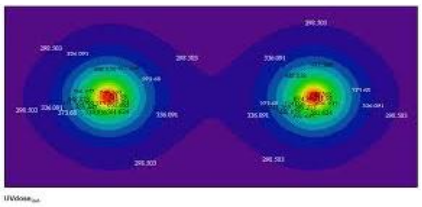
ADVANCED CURING SOLUTION WITH CONTEMPRORARY DESIGN

INNOVATION & QUALITY

Verentia relies on high-quality materials and precise workmanship to produce high quality UV systems be it for Bio Science, Curing, printing or Disinfection market. Verentia has developed an innovative UV LED dryer for curing all types of UV coating and adhesives. Depending on the material requirement, the system is available with UV LED curing lamps. Thanks to its compact design, the system can be adapted to suit any production environment



HIGH STANDARDS IN DESIGN, MANUFACTURING AND QUALITY



Industrial and medical fraternity at hospitals encounter various tasks, surgeries, examinations and treatments. Hygiene in the workplace is almost constantly challenged. Disinfection Performance and reliability of medical equipment is therefore especially paramount., at the same time, the subject of economic efficiency gains in importance. Intelligent and high quality disinfection solutions help to reduce ongoing operational costs significantly at the same time improving customer trust significantly.

PROUCT DESIGN AND FLEXIBILITY

The use of UV LED technology permits high Irradiance, optimized thermal design allows low heat build-up, a maintenance free service life, high efficiency, high Fluence and thus maximum economic viability. We do more than just design, develop, manufacture and supply electronic power supplies and UV lamps, we specializes in tailoring our UV/LED equipment to our customers' unique technology needs and business environments

HIGH IRRADIATION, DIFFERENT WAVELENGTH & COMPACT DESIGN

TruspectraUV comes with inbuilt high performance LED with high Irradiance factor to suit individual needs of the customer from 230nm to 405nm. TruspectraUV offers unparalled ease in controlling different wavelength through specially designed electronics which is integrated inside the compact and aesthetic housing at the same time thermal engineering support long life and ease in maintenance.

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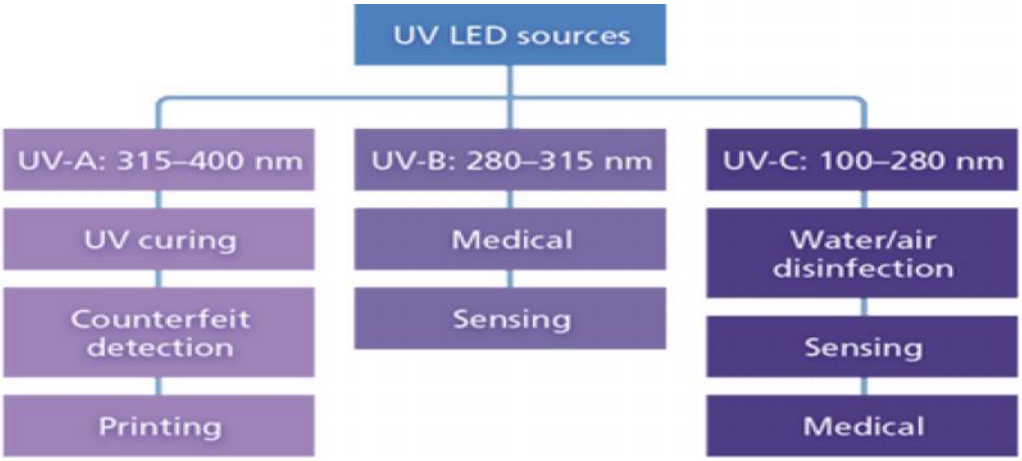
APPLICATION OF UV LED IN INDUSTRY, BIO SCIENCE AND DISINFECTION

INDUSTRY APPLICATIONS

Visible-spectrum LEDs have penetrated into TV and mobile backlighting, automotive, general lighting, signage, and other markets, ultraviolet (UV) LEDs are just beginning to replace incumbent UV sources in diverse applications, including curing, counterfeit detection, medical, sensing, printing, and water/air disinfection.



230 to 400 nm: optical sensors and instrumentation
230 to 280 nm: UV ID verification, barcodes
240 to 280 nm: sterilization of surface areas and water
250 to 405 nm: forensic and bodily fluid detection and analysis
270 to 300 nm: protein analysis, drug discovery
300 to 320 nm: medical light therapy
300 to 365 nm: polymer and ink printing
375 to 395 nm: counterfeit detection
390 to 410 nm: superficial / cosmetic sterilization

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UV LED BASED SMC CURING SYSTEM ADVANTAGES

CONNECTING YOUR BUSINESS TO THE TECHNOLOGY RESOURCE YOU NEED FOR YOUR SMC/COMPOSITES CURING APPLICATIONS

LED is reliable and mature technology, LED lamps reliably provide reduced downtime, long lifetimes, and low costs of ownership

Flexible form factors, LED technology is fundamentally a more compact technology than traditional lamps due to the LED packaging densities. Chip-on-Board (“COB”) LED technology describes the mounting of bare LED chips in direct contact with a substrate to produce LED arrays

Multi wavelength capability, LED sources provide users with greater opportunity to optimize their curing system by designing a multi-wavelength system that closely matches the absorption spectrum of the media being cured leading to greater production efficiencies

Precise control each of the LED in circuit can be individually controlled by dedicated driver circuitry. This localized control of LEDs allows for more precise adjustment of the LEDs to improve overall stability and uniformity

Stability and efficient, electronic control allows the light-output & intensity of the LEDs to be kept stable for a long time. further this level of control is scalable from a couple of LEDs to thousands of LEDs.

Reduced downtime: the UV LED lamps windows are routinely cleaned to remove the cured material. Apparently Verentia UV LED can be specified with a removable window where the window can be quickly exchanged for a new one reducing downtime

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ADVANCED CURING SOLUTION WITH CONTEMPRORARY DESIGN

CONNECTING YOUR BUSINESS TO THE TECHNOLOGY RESOURCE YOU NEED FOR YOUR SMC CURING APPLICATIONS

Heat Sensitive substrates, Very little heat is generated from the LED output onto the substrate being cured. This characteristic of LEDs is important for applications where heat sensitive substrates are utilized

Instant switch on, LEDs are instant-on, and can be configured to output light in continuous, flashed or pulsed modes across a wide dynamic intensity range while maintaining the desired spectral distribution.

Real time monitoring, To ensure stability across the lifetime of the lamp, various monitoring functions can be built-in to the lamp such as thermal monitoring of the LED substrate temperatures, short circuit monitoring, or in-rush voltage protection.

Environmental friendly, LEDs are more environmentally friendly than traditional technologies because they emit no harmful UVC or contain toxic heavy metals, such as mercury. LEDs can also tolerate higher ambient operating conditions than traditional lamp technology.

Ease of installation & cost benefit, LED systems offer significant benefits over the life of the lamp. Mercury lamps have short lifetimes and require frequent replacement. LEDs do not require ancillary components such as filters and venting system. Operating costs of LED based systems is also lower due to instant-on/off. Thus supports extended lifetime of the LED over mercury UV lamps..

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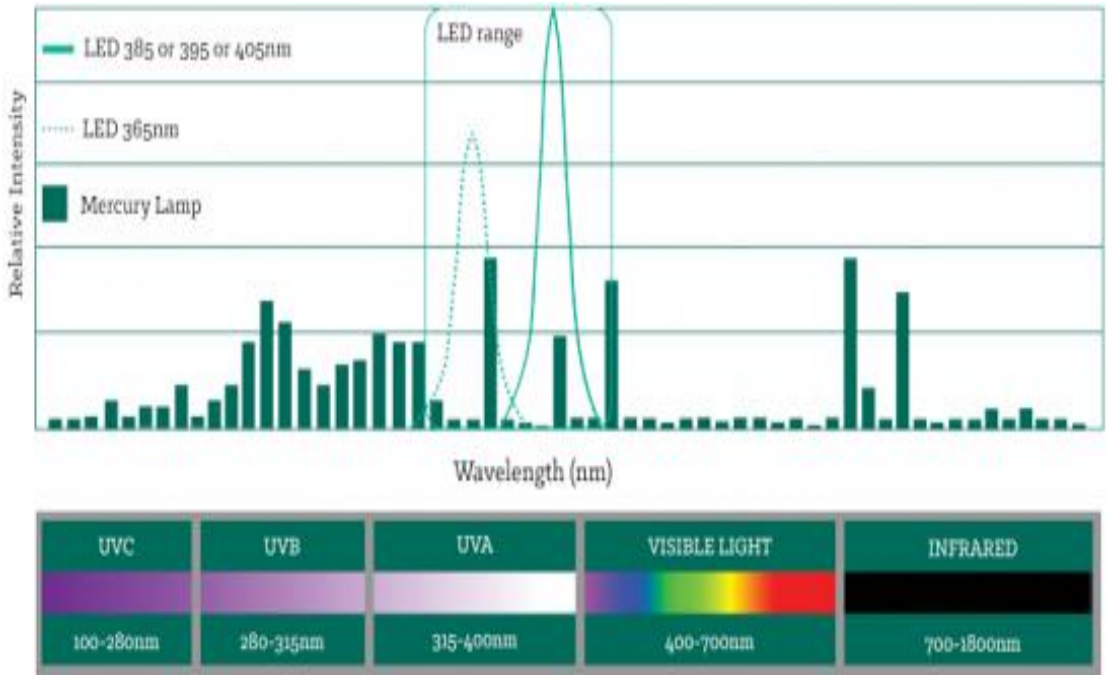
EXPERIENCE THE FUTURE OF UV LED CURING SYSTEMS

UV curing is a process in which ultraviolet light and visible light is used to initiate a photochemical reaction that generates a cross-linked network of polymers. UV Curing is adaptable to printing, coating, decorating, stereo lithography and assembling of a variety of products and materials owing to some of its key attributes, it is: a low temperature process, a high speed process, and a solvent less process., cure is by polymerization rather than by evaporation.



The typical light source spectrum wavelength ranges from Ultraviolet Light (UVC 200-280nm, UVB: 280-315nm, UVA 315-400nm) to Visible Light (400-760nm) and Infrared Light (760-3000nm).

UV LED sources have a concentrated narrow spectral emission. LED sources are typically described by their peak emitting wavelength, but in practice UV LED sources emit in a distribution that is typically +/-20nm from the specified peak. For example a “395nm” LED source typically emits 96% of its energy between 380nm and 420nm with the distribution being essentially Gaussian.

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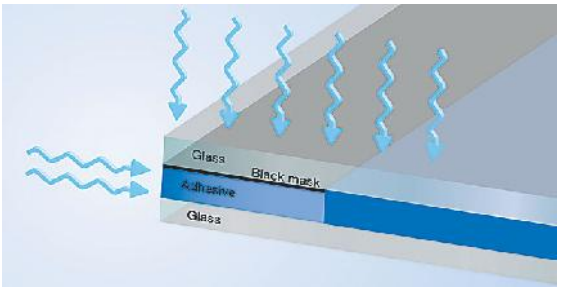
BOOST PRODUCTIVITY WITH UV CURING ADHESIVES

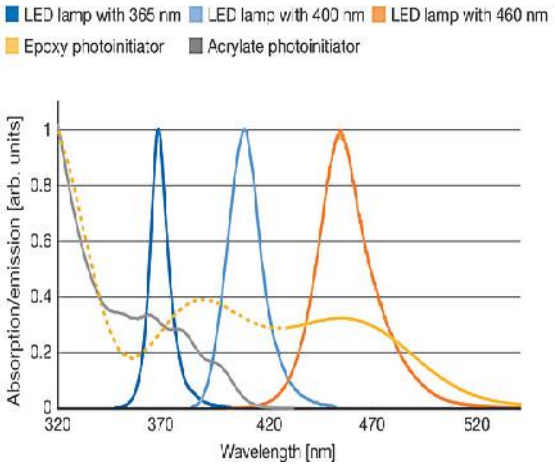
UV Curing adhesives polymerize quickly on-demand and are ideal for Automotive Automated Assembly Processes

For mass-production on assembly lines, UV- and light-curing adhesives offer significant advantages over other joining methods.



They are generally solvent-free and one-component materials, so they can be integrated into continuous manufacturing processes safely and easily. Because they polymerize in seconds when exposed to ultraviolet or visible light, they won't compromise cycle time in automated assembly processes. Curing with light is much less energy-intensive than curing with heat.

Curing occurs with deliberate exposure to light of a certain wavelength, not just any light, so components can be positioned precisely before the adhesive hardens. The adhesives can bond components that are too small to be screwed together. And finally, they have outstanding optical qualities. When bonding layers in a touch screen, they can reduce reflections and improve readability, even in direct sunlight.



There are two main types of UV-curing adhesives. Radically initiated adhesives are usually based on an acrylate matrix, while catatonically initiated adhesives are based on epoxy resins. These one-component adhesives are simple to process. No mixing is required. In addition, both types of adhesive are available in dual-curing formulations. These materials usually cure with a combination of light and heat or humidity. This ensures that the adhesive will cure in areas that cannot be directly illuminated by light.

For both chemistries, it's essential to match the wavelength of the UV light source with the trigger of the photo initiator to ensure an effective curing reaction. Light sources based on LEDs are favored, because their peak emission spectra match the wavelengths needed to activate the photo initiators. LED lamps are available with different wavelengths to suit a range of adhesives and photo initiators.

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AUTOMOTIVE GLASS CURING AND PRINTING APPLICATIONS

AUTOMOTIVE SWITCHES

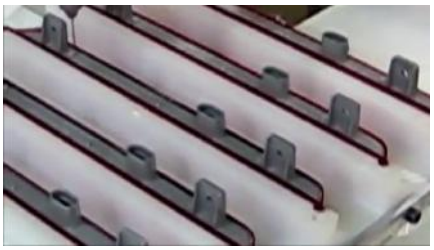
Verentia TruSpectra UV cure systems can be designed for various wavelength to suit the requirement of the coatings. TruSpectra also features inbuilt optics designed to have uniform Irradiance and Fluence over SMC which enables TruSpectra to cure the coating efficiently within the designed dwell time. One critical aspect to using or adopting UV-curing technology for composites manufacturing is the need to match the type, power and intensity of the light source to the application. Also important is an understanding of the best way to present the part to the UV light in order to optimize the process.

Light-curing adhesives are particularly well-suited for high-volume assembly processes, where rapid curing and high reliability are essential. The following examples illustrate the range of applications for UV-curing acrylate- and epoxy-based adhesives.

In the automotive industry, process reliability is important for assembling safety-critical devices, such as air bag deactivation switches and seatbelt monitoring switches. Because these devices are produced in the millions on high-speed automated assembly lines, they require an adhesive that is easy to dispense and fast-curing. Process control is essential. Because they are more cost-effective and reliable, light-curing adhesives are increasingly being used in place of two-component or heat-curing adhesives and casting compounds.

When assembling these snap-action switches, hermetical sealing of the housings and connectors is essential for withstanding environmental conditions during vehicle operation. It's often necessary to bond the housing and seal the connector pins in a single step, a process known as seal bonding. Two-component or heat-curing adhesives and encapsulates are neither particularly reliable nor cost-effective for such applications. The complex and high-maintenance equipment for processing two-component adhesives work only when large amounts (more than 100 milligrams) are dispensed.

AUTO PARTS BONDING



In contrast, UV- and light-curing adhesives are optimized for bonding auto parts and sealing them against fluctuating temperatures, humidity, contaminants, pressure and shocks. (Light-curing adhesives for such applications remain flexible over a temperature range of -40 to 176 F.) The operating costs of curing lamps are much lower than those of heat-curing ovens. Light-curing adhesives are easy to dispense in high-volume automated assembly lines. Their constant viscosity and unchanging flow properties facilitate complete wetting of the parts, which leads to reliable seal. The adhesives cure within seconds—much faster than thermal curing—and the bond holds up exceptionally well through years of use.

In addition, 100 percent in-line control of seal tightness is possible, since acrylate-based, UV-curing adhesives achieve final strength immediately after irradiation. Fully automated camera inspection of the bond can be done in-line by using colorants or fluorescent agents in the adhesive, ensuring detection of insufficient adhesive or possible contaminations at the connector pins.

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AUTOMOTIVE GLASS CURING AND PRINTING APPLICATIONS

AUTOMOTIVE GLASS CURING

Automotive manufacturers are continuously looking for ways to reduce cost and increase efficiency. UV curable chemistries can certainly contribute to both of those efforts. Auto Glass UV CURING has great potential to replace thermal curing ovens In terms of capital costs space utilization, energy consumption. Other areas of cost savings can come from reduced parts in process and shorter processing time which directly relates to lower inventories. Quicker cure allows for fewer particles to contaminate the surface finish which directly relates to rework and scrap costs I have by no means touched on all the UV applications currently utilized by the automotive industry, application that has been commercial for many years is the process of applying a combination of carbon black ink and glass frit to the border of automotive glass. This combination of carbon black, glass frit and a UV curable resign is silk screened on to a flat piece of glass and immediately run through a UV oven. This keeps the ink from being smeared or contaminated. The glass is then fired in a sag mold to produce the proper shape of the glass. The high temperature of the sag mold also burns off the UV resign and melts the carbon black in glass frit onto the glass so the glass and silk screen become one. The UV process is time and space efficient

AUTOMOTIVE GLASS REFINISH AND REPAIR

T he use of UV coatings in the automotive refinish and repair market has been growing over the last two years. To date, only primer applications are available to the body shop; however, additional coatings may be introduced into the marketplace. Likewise, the number of suppliers offering UV coatings and related refinish products is expected to surge as the technology becomes more widespread and applicable to automotive refinish procedures

When choosing a UV lamp for a refinish shop, it is important to follow the recommended curing range suggested by the coatings manufacturer. UVA lamps provide wavelengths in the 320-400 nm range. Many coating suppliers have tested available UV curing in the automotive refinish industry and can make suitable recommendations.

Recent body shop interviews indicate that the most important feature in UV lamp design is the footprint (coverage area) and consistency of cure. These features are a result of lamp design and engineering, specifically, the energy output and the reflector design of the lamp. For example, a 400-watt lamp cures with more intensity than a 250-watt lamp. Combined with effective reflector design, larger and consistent curing areas can be attained Curing may vary from one coating to another, but currently they range from 2- 5 minutes for complete cure. Investors should check with the particular coatings supplier to clarify expectations. The size of the footprint is determined by the design of the reflector. A broadcast type or conical reflector generally produces a larger cure area than a focused type reflector design. Distance from the surface has an effect on curing times and consistency

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AUTOMOTIVE UV CURING APPLICATIONS

AUTOMOTIVE HEAD LAMP

The specific automotive application where UV has become the standard technology is in the automotive forward lighting industry, where UV coatings have been used progressively. Headlamps are composed of two primary components that need to be coated -- the polycarbonate lens and the reflector housing. The lens requires a very hard, scratch-resistant coating to protect the polycarbonate from the elements and physical abuse. The reflector housing has a UV basecoat (primer) that seals the substrate and provides an ultra-smooth surface for metallization. The reflector basecoat market is now essentially 100% UV cured. The primary reasons for adoption have been improved productivity, small process footprint and superior coating-performance properties.

Though the coatings used are UV cured, they do contain solvent. However, most of the overspray is reclaimed and recycled back into the process, achieving close to 100% transfer efficiency. The focus for future development is to increase the solids to 100% and eliminate the need for an oxidizer.

AUTOMOTIVE EXTERIOR PLASTIC PARTS

One of the lesser known applications is the use of a UV curable clearcoat over molded-in-color body side moldings. Initially, this coating was developed to decrease the yellowing on exterior exposure of vinyl body side moldings. The coating had to be very tough and flexible to maintain adhesion without cracking from objects striking the molding. The drivers for the use of UV coatings in this application are the speed of cure (small process footprint) and superior performance properties

NEW TREND FORGING IN AUTOMOTIVE INDUSTRY

The recent past has been full of hurdles for UV chemistry suppliers to overcome. Through diligent and creative work, many of these hurdles have been overcome. The UV chemistries of today are environmentally safe, as well as much safer for human contact. The chemistries are extremely process efficient and increases in the use of raw materials and more efficient manufacturing methods have made them cost competitive. So what are the barriers to wide spread implementation of UV processes in automotive or any other area of manufacturing? I believe it is only our imagination that is between us and our next UV application. Don't accept old ways of processing only because it is the way it has always been done. Push your chemistry and equipment suppliers to develop faster, better, less expensive methods of processing. Your pursuit of a faster, better, less costly process will naturally lead you to a UV process

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INNOVATIVE, RELIABLE AND EXCELLENT BENCHMARK PERFORMANCE

Wavelength	365	385 / 395	405
Peak Intensity	27 W/cm^2	27 W/cm^2	34 W/cm^2
Irradiance window	25 x 15	25 x 15	25 x 15
System Power	15.4W	15.4W	14.2W
Estimated head life expectancy			
Operating Ambient temperature	35 ^{o}C	35 ^{o}C	35 ^{o}C
Operating Ambient humidity	75%	75%	75%
Cooling method	Heat Sink / Heat Pipe / Chiller		
Chiller Capacity	250W to 550W		
Chiller Flow rate	1.5LPM—5 LPM		
Pressure Drop	0.0018-0.0022 Bar		
Connections	8” NPT		
Warranty	I year		
Voltage and frequency			
Potential free error signal	Earth Fault, Total Error, Lamp Error, Phase Loss, Over Temperature, Output Signal UV Ready, Phase Loss, UV ON		
Finish	Matte black		

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INNOVATIVE, RELIABLE AND EXCELLENT BENCHMARK PERFORMANCE

Irradiance values	1 - 7 W/cm2
	8-17 W/cm2
	18-26 W/cm2
	27-35 W/cm2
	36-50 W/cm2
Emitting window length	25 - 100mm
	125 - 225mm
	225 - 350mm
	350mm - above
Cooling Method	Heat Sink
	Heat Sink with cooling fan
	Heat Pipes
	Heat Pipes with fan
	Water cooling
Wavelength	365nm
	385nm
	395nm
	405nm
Applications	Adhesive curing, wood coating curing
	Fiber optic curing
	Counterfeit, Fluorescence
	Lithography
	Printing (Ink) curing
	Optical coating
	SMC coating curing

TruSpectra

VERENTiA

VerentiaSol India Private Limited

Gat 1101, Pune Saswad Road,

Behind Vatika Ashram,

Wadki, Pune - 412308

Maharashtra, India

Mobile +91-8169868690

Email: shree.katyayani@verentia.com