

UV Ink Curing

LC-6 Benchtop UV Curing Unit

What is UV Curing?

What is UV Curing?

Ultraviolet curing (commonly known as UV curing) is a photochemical process in which high-intensity ultraviolet light is used to instantly cure or “dry” inks, coatings or adhesives. Offering many advantages over traditional drying methods, UV curing has been shown to increase production speed, reduce reject rates, improve scratch and solvent resistance, and facilitate superior bonding.

Who Uses UV Curing?

Since it was originally introduced in the 1960's, UV curing has been widely adopted in many industries including automotive, telecommunications, electronics, graphic arts, converting and metal, glass and plastic decorating. UV curing is a multi-billion dollar worldwide industry, and now constitutes approximately 4% of the industrial coatings market. UV curing has grown more than 10% per year, displacing conventional water and solvent-based thermal drying processes due to its increased productivity, improvement of product quality and performance, and environmentally friendly characteristics.

A Quick Explanation of the Science Behind UV Curing

Using light instead of heat, the UV curing process is based on a photochemical reaction. Liquid monomers and oligomers are mixed with a small percent of photo initiators, and then exposed to UV energy. In a few seconds, the products - inks, coatings or adhesives instantly harden.

UV curable inks and coatings were first used as a better alternative to solvent-based products. Conventional heat and air-drying works by solvent evaporation. This process shrinks the initial application of coatings by more than 50% and creates environmental pollutants. In UV curing, there is no solvent to evaporate, no environmental pollutants, no loss of coating thickness, and no loss of volume. This results in higher productivity in less time, with a reduction in waste, energy use and pollutant emissions.

Look What UV Curing Can Do For You

UV curing offers manufacturers many benefits. Below you'll find additional information on some of the most significant ones.

- Inks, coatings, and adhesives with dramatically improved physical properties.
- Faster production speeds and capacity
- Reduction of Work-in-process
- Dramatically reduced set-up/clean-up labor
- Environmentally Friendly, Energy savings, no emissions controls
- Less floor space needed
- Increase yield and reduce scrap

UV Ink Curing

LC-6 Benchtop UV Curing Unit

What is UV Curing?

Inks, coatings, and adhesives with dramatically improved physical properties

The reasons for considering UV usually include a number of improved physical properties such as improved gloss, better scratch and abrasion resistance, better chemical resistance, resistance to "crazing," hardness, elasticity, adhesion, or bond strength. While these technical features can be measured precisely, determining their actual economic value is usually based on superior product performance which may result in increased market share or increased sales.

Faster production speeds and capacity

Any process requiring less space, allowing higher production speeds, involving less direct labor, makes those facilities and resources available for higher production capacity. Less down time and higher throughput increase machine utilization, and have a direct effect on plant capacity. In general, UV curing offers increased productivity and better plant and equipment utilization.

Reduction of Work-in-process

This factor has become one of the most powerful cost factors in reduction of manufacturing cycle time. Reducing work-in-process saves significant capital and improves cash flow.

A manufacturer of complex electro-optical devices manufactures a product which, when assembled, carries a value of approximately \$50,000, and produces 50 assemblies per month. Ten to fifteen adhesive bonds are required in each of the subassemblies which go into a complete product, and a total of approximately 100. When using both RTV and epoxies for these bonds, each bond or seal required two to three days to set up before it is tested, and sequential assembly is necessary. The total cycle time of the product was four months.

Dramatically reduced set-up & clean-up labor

Because UV chemistries won't cure without exposure to UV energy, they can often be left overnight without fear of the ink or coating "drying" in the machine. This is often an advantage for graphic arts printing presses, plastic decorating machines, marking/coding machines, etc. The example below is for a graphic arts printing press.

Press Set-Up/Clean-Up

The number and types of presses, type and complexity of jobs, run lengths all affect uptime. The reduction of set-up and clean-up required with UV is the most often recognized operating cost benefit associated with UV.

UV Ink Curing

LC-6 Benchtop UV Curing Unit

What is UV Curing?

Less floor space needed

Typically drying ovens require significantly more floor space than a UV curing process. For example, a drying oven for a conventional web coating line may extend for 50 to 100 feet, a space consumption in the neighborhood of 500 to 1000 square feet. At a floor space cost alone of only \$0.50/ft²/month, that costs \$3000-6000 per year. The equivalent UV "dryer" would require 50 to 100 square feet.

Some processes require long cure times which can increase the floor space needed. For example, adhesive and potting applications using two-part adhesives or RTV types of compounds must allow cure time, usually measured in days. If the number of parts is large, the consumption of floor space could be significant. Fiberglass composite parts also require significant cure times and because the parts are usually quite large (bathtubs and showers) the floor space needed for part curing can be significant. UV curing significantly reduces the cure time in these examples, thus reducing the floor space requirements.

Increase yield and reduce scrap

Because UV curing only takes seconds, detection of curing problems can happen immediately, thus reducing scrap. For example, a two-part adhesive might take days to fully cure and then quality control testing can be done. During this time production continues, possibly resulting in scrap parts.

In painting and coating applications, the reduced time it takes to UV cure eliminates the chance for dust and particles to contaminate the part surface during painting – another common cause for scrapped parts. In some UV processes, quality control procedures call for inspection of the ink, coating or adhesive application prior to UV curing. If any problems are found, the ink, coating or adhesive can be easily removed, the problem solved, and the part put back on the production line.

UV Curing Applications

Fusion UV Systems provides industry and business solutions utilizing UV curing equipment that dramatically improves quality, efficiency and productivity in manufacturing. Listed below are some of the more noteworthy market applications of UV curing and specific customer solutions.

[Automotive](#)

[Composites](#)

[Converting & Siliconizing](#)

[Electronics](#)

[Flooring](#)

[Glass Decorating](#)

[Graphic Arts & Printing](#)

[Medical Devices, Products & Components](#)

[Metal Container Decorating & Coating](#)

[Metal Painting and Decorating](#)

[Optical Fiber](#)

[Optical Media \(CD/DVD\)](#)

[Pipe & Tube Coating](#)

[Plastic Decorating and Coating](#)

[Pressure Sensitive Adhesives](#)

[UV Powder Coating](#)

[Wood](#)