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DUAL CURE UV COATING



## DUAL CURE UV COATINGS: FAST DRYING AND LOW VOC WITHOUT SACRIFICE IN APPEARANCE

By combining ultraviolet curing with conventional cross-link curing, the dual cure process results in accelerated drying and increased capacity at temperatures unlikely to impair the appearance or adhesion of wood surfaces. The Sayerlack line of dual cure coatings, formulated by Arch Coatings for the process, takes advantage of these production benefits while reducing typical VOC levels, allowing a greater recovery rate, and providing an attractive finish with excellent durability. Together, the process and the coatings provide an economical means of boosting production and applying finish.



## DEVELOPMENT OF THE TECHNOLOGY

The dual cure process was originally developed in the mid 1990s in Europe by Arch Coatings (then called Hickson Coatings) in conjunction with equipment manufacturers. It was devised initially as a means of increasing capacity of existing finishing lines. By speeding the drying, cycle time was reduced and output increased. The process has been granted a European patent.

The integration of cross-linking chemistry with UV curing has combined the user-friendly benefits of conventional coating with the speed, durability, and low-VOC generation of UV coating.

Now well-established in Europe, the process is becoming more popular in North America, where it was introduced in 2000. The coating can be applied by spray or curtain equipment, and using vertical reciprocators and electrostatic systems.

It is being used to produce kitchen and bathroom cabinets, fine furniture, flooring, and interiors for automotive vehicles, aircraft, and luxury boats.

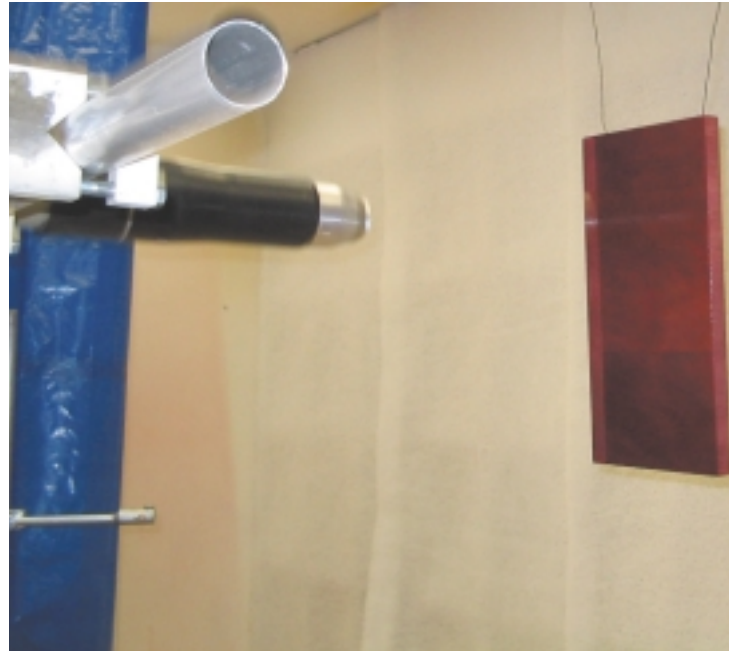


## SUMMARY OF FEATURES

The combination of the dual cure process and Sayerlack coatings results in noteworthy benefits:

- Quick drying (2-5 minutes from spray to stack)
- Shorter drying line
- Greater production volume
- Low-temperature drying
- Elimination of problems common with UV-only curing
- Low VOC emission
- High rate of coating recovery
- Low film weights possible
- Excellent appearance and durability
- Various formulation options
- Compatible with full range of stains, glazes, and tints
- Applicable by spray or curtain, in flat, vertical, and electrostatic systems

The end result is increased capacity and economical application without a sacrifice in coating performance.



## FASTER CYCLES, VERSATILE PRODUCTION

Whether built into a new operation or to increase the capacity of an existing line, the fast drying time yields impressive production benefits. Drying can take as few as two minutes from spray to stacking. This increases line capacity, and can shorten significantly the length of a spray line.

Yet the drying is thorough. Because of the dual cure process, shadowed areas that may miss UV exposure will still cure fully by the cross-linking chemistry. Moreover, porous substrates create fewer curing difficulties.

With conventional systems, high drying temperatures often distort solid timbers, particularly softwoods, or lead to pitch around knots that impair adhesion. The dual cure system does not require such temperatures - 40-50° C is adequate for most pre-drying and cold UV can be used for final drying - so unnecessary stress is not placed on wood.

Environmental restrictions are less of a production problem. Sayerlack dual cure UV coatings contain less than 1.7 pounds of VOC per gallon of solvent.

The coatings can be applied by spray or curtain equipment. They are suitable for both vertical reciprocators and electrostatic systems, making dual cure processing possible for hanging lines as well as flat line finishing.

There are also financial advantages. The Sayerlack coating has a higher recovery rate than typical coatings. Reusable material is more easily recovered from belts. And, in many instances, application film weight can be reduced, thereby requiring less solution.

## CUSTOMER-PLEASING PERFORMANCE

The advantages do not end at the production line; consumers get an exceptional finish. As with quality conversion varnishes, these coatings are capable of a high opacity and a smoothness that last. The durability of the coating has been confirmed by the results of tests done in accordance with protocols of the Kitchen Cabinet Manufacturers Association. Coatings are made in both clear and fully pigmented systems, with variations available in gloss, build, species suitability, and other details. Nevertheless, they are compatible with common stains, glazes, and tints.

Because of reductions in application volume and high recovery rates, some manufacturers have found this coating to be more economical than other alternatives, while they boosted capacity, met VOC regulations, and satisfied customers.



## SAYERLACK AND ARCH

The Sayerlack name has been associated with exceptional wood coatings since the company was established in 1954. Sayerlack became part of Hickson International in 1987, which was acquired by Arch Chemicals in 2000. It is the core of Arch Coatings.

From its base in Pianoro, Italy, Arch Coatings serves customers around the world with a broad array of wood coatings for countless species. We pride ourselves on creating "innovative wood solutions" and offering service that enables customers to make best use of our products. Through our intensive R&D effort, we have become an acknowledged worldwide leader in coatings based on waterborne technology. This expertise is being extended to other types of finishes, as is seen in our development of dual cure UV coatings. Arch Coatings U.S.A. is located in Smyrna, Ga., with R&D operations in Brandenburg, Ky.

The parent company, Arch Chemicals, is a global specialty chemicals corporation with annual sales exceeding \$1 billion. Headquartered in Norwalk, Conn., the company comprises two main components, Treatment Products and Performance Products. Among our distinguished chemicals are HTH® water purifiers, wood preservatives, anti-dandruff ingredients, and industrial and cosmetic biocides, as well as coatings.



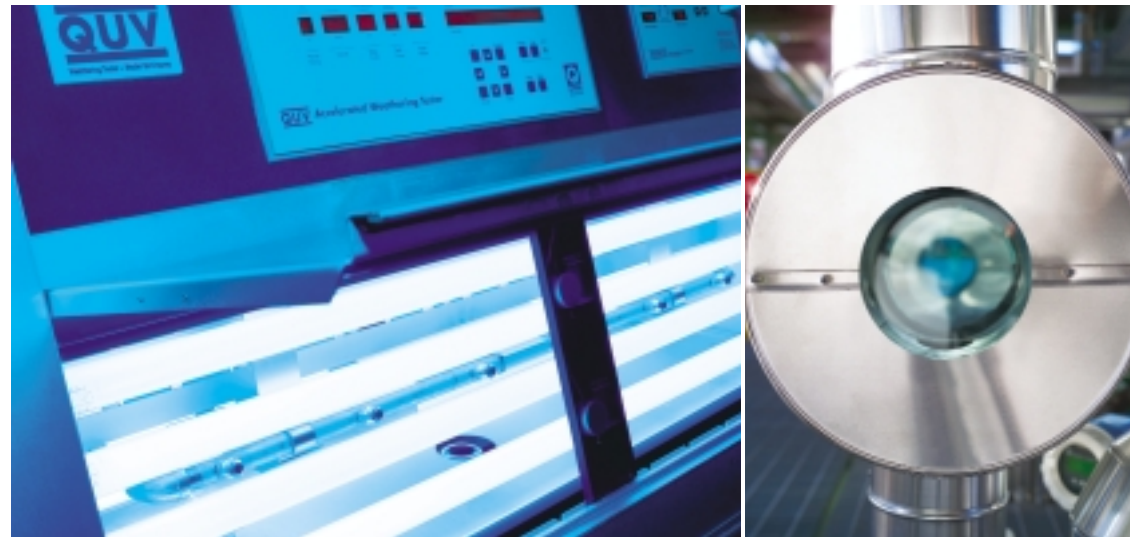
## EFFECTIVENESS VERIFIED IN KCMA TESTS

The protection provided by the Sayerlack dual cure UV coating has been verified in industry-accepted testing. Coated panels have been subjected to tests described in the Performance and Construction Standard of the Kitchen Cabinet Manufacturers Association.

The Hot and Cold Resistance procedure, KCMA 9.2, tests the ability of the finish to withstand hot and cold cycles for prolonged periods. A coated door is acclimated to room conditions, then placed in a hotbox at 120° F and 70% humidity. After one hour, the door is removed and allowed to re-acclimate to room conditions for 30 minutes, at which time it is placed in a coldbox for one hour at -5° F. This is repeated for five cycles.

The dual cure UV coated panels scored the highest rating, 5, in this test. See the explanation of ratings.

KCMA's 9.3 procedure, Chemical Resistance, tests a coating's ability to withstand substances typically found in kitchens and around homes. Prescribed amounts of these substances are placed on panels and allowed to stand for predetermined times, 24 hours for all except for mustard at 1 hour. The panel is then cleaned and evaluated.



The table below shows the test substances and the results for the dual cure UV coating on maple panels. There was no visible damage from nine of the substances, and only slight change in luster from mustard.

SUBSTANCE	EXPOSURE (HOURS)	RATINGS*
Vinegar	24	5
Lemon Juice	24	5
Orange Juice	24	5
Grape Juice	24	5
Tomato Catsup	24	5
Coffee (115° F)	24	5
Mustard	1	4
Detergent Solution (H <sub>2</sub> O +1/2 % wt.)	24	5
Olive Oil	24	5
100 Proof Alcohol	24	5

**\*Explanation of ratings**

- 5... No visible disturbance of the finish (no damage)
- 4... Slight change in luster, visible only when the light source is mirrored in the test area and is reflected toward the observer's eye, or a few isolated marks just visible
- 3... Slight mark, visible in several viewing directions (for example, almost complete disc just visible)
- 2... Strong mark distinctly visible and/or region of slight discoloration and/or region of slight disturbance of the test surface
- 1... Strong mark and/or region of distinct discoloration and/or region of distinct disturbance of the test surface



Opened in 2001, the Arch Coatings R&D operation in Brandenburg, Ky., represents a \$1 million investment. Equipped with advanced application and drying systems, the center has a low-pressure UV curing unit for fully pigmented UV coatings and can reproduce numerous combinations of air, infrared, and UV drying. An even larger research facility exists at the headquarters of Arch Coatings in Italy.