

Status of UV&EB in NORTH AMERICA 2006



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The RadTech UV&EB North American Update is the result of surveys sent to the UV&EB community—including suppliers, users, academics and consultants. Approximately 90 individuals responded to the survey this year and written submissions were supplemented by calls to discuss the state of the industry.

UV&EB Formulated Product Usage North America (Metric Tons)

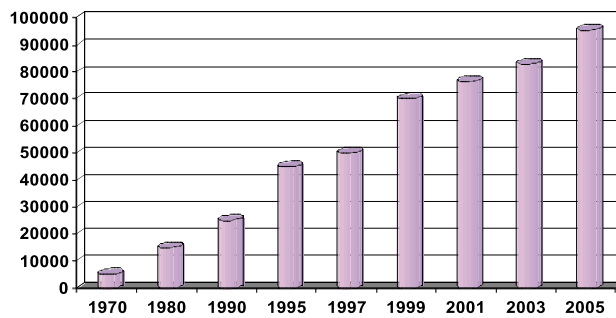


FIGURE 1

For the 35th consecutive year UV&EB formulation consumption grew in North America, reaching about 95,000 metric tons in 2005 (Figure 1). Demand for UV&EB is now growing at just over 7% annually, marking the fastest growth rates since 1999. Historically, when UV&EB products were introduced in the 1970s, demand tripled during the first decade of market acceptance. The industry grew by another two-thirds in the 1980s; and in the 1990s, it nearly tripled again before the U.S.

economic slowdown impacted the industry the first part of this decade. Survey results indicate optimism of continued high-single digit overall growth over the next three years with certain applications reaching double-digit gains.

Metric Distribution of UV&EB Materials 2005 (Volume)

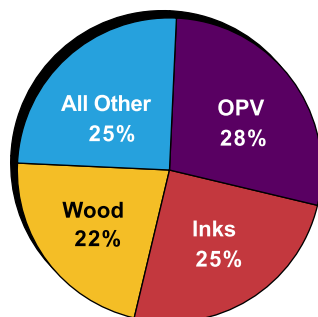


FIGURE 2

Growth in UV&EB technology in North America by volume has been driven by applications in graphic arts and wood (Figure 2). While other applications such as electronics account for considerable industry sales and growth, the actual volumes of formulated product usage are smaller. Survey respondents indicate continued significant growth opportunities in certain segments of wood and graphic arts, as well as penetration into various new industrial coating applications.

While the UV&EB industry has been global from its inception, the trend continues to accelerate with the impact of global economic, energy and environmental trends. Incipient European emission directives and increasing corporate environmental responsibility initiatives, coupled with worldwide energy concerns, offer new opportunities for the technology.

Mexico's Share of North American Distribution of UV&EB Usage

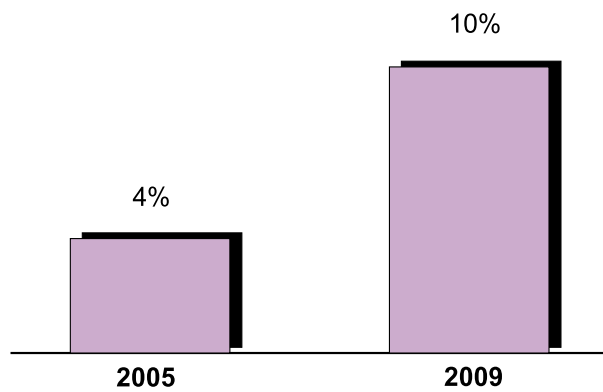


FIGURE 3

Indicative of the continued internationalization are survey projections of Mexican UV&EB market growth. Over the last decade or so, Mexico's share of North American UV&EB formulated product consumption has been steady at 3-4% (Figure 3). This survey, for the first time, indicates a new potential trend, predicting a jump in the use of the technology in Mexico as the country's share more than doubles by 2009, while the U.S. share declines and the Canada share increases slightly.

Major Motivations for Using UV&EB

1. Increase Productivity
2. Improved Physical Properties/Product Performance
3. Enabling Technology/New Capabilities for User
4. Cost Effective/Lower Price
5. Environmental Compliance/Green Technology

FIGURE 4

Despite increasing "eco-efficient" measures by corporations, "green" was largely absent from survey responses concerning the reasons for the use of UV&EB materials. It is very much the operational, efficiency and product quality benefits that continue to drive growth in UV&EB (Figure 4). While UV&EB technologies do in fact offer superior environmental profiles, survey respondents indicate that the actual decision to go with the technology is typically justified on more traditional investment criteria.

Survey respondents pointed to several areas that may be primed to breakout as “killer applications” for UV&EB technology:

- Digital Inks/Inkjet—including flat bed printing for graphic arts, electronics applications, as well as inkjet for rapid prototyping and small part manufacture.
- Food Packaging—FDA recognition of certain UV&EB materials for direct food contact, based on the work of the RadTech Food Pack Alliance, may lead to better acceptance of the technology in food packaging. Alliance efforts would also likely encourage further FDA submissions leading to a range of accepted materials.
- Aerospace/Defense—including interiors, exteriors, field repair and OEM.
- Automotive—including interiors, exteriors, refinish and parts.
- Metals—including general metal products and coil coatings.
- “Contractor” applied UV—for field repair, refinish and architectural applications.

Primary UV&EB R&D Objectives 2006

1. Better Adhesion to Plastics/Metal
2. Lower Cost Formulations
3. Improved Application Properties
4. Faster Cure Speed

FIGURE 5

R&D objectives highlight the fact that suppliers are as active as ever in developing UV&EB, with increasing interest on industrial coatings (Figure 5). The trend also continues that potential new suppliers are exploring entry into UV&EB. “Better adhesion to plastics and metals” is listed as the number one priority for the first time, as several survey respondents pointed to increased R&D efforts into industrial applications in areas such as automotive, aerospace, general plastic products and parts, and metal products and parts. Much of this emphasis is driven by potential customers, looking to UV&EB as a way to meet environmental regulations, reduce energy costs and competitively manufacture high-quality products.

OPV North America UV&EB Usage (Metric Tons)

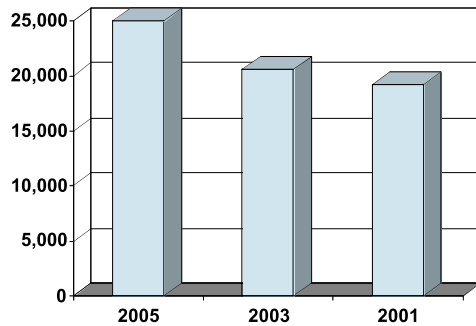


FIGURE 6

odor accounts for only about 10% of the UV&EB OPV market, but over the last couple years has grown at more than twice the rate of general purpose OPV.

Graphic Arts

Over print varnish for graphic arts or OPV is by far the leading use, by volume, for UV&EB formulated product, accounting for about one-quarter of the total North American market and reaching about 25,000 metric tons in 2005 (Figure 6). “General Purpose” or commodity-type OPV accounts for the bulk of this category and continues to register growth of about 8% per year. “Specialty” OPV—imparting special characteristics into the coating such as anti-slip or low

Inks North America UV&EB Usage (Metric Tons)

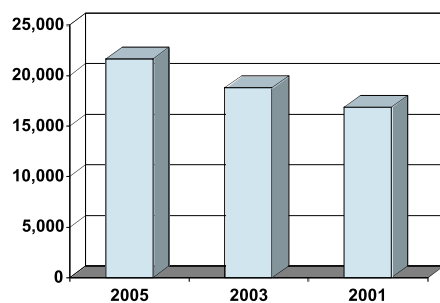


FIGURE 7

UV may be considered a “mature” technology, with future growth depending on the health of the screen printing industry. For the first time, RadTech collected data on UV-inkjet usage, showing it accounted for about 5% of the total UV&EB ink market in 2005. However, UV-inkjet growth is expected to grow significantly over the next 5 years with survey estimates showing as much as a quadrupling or more. The market for UV&EB flexo inks continues rapid growth, showing double-digit rates over the last couple years—with the trend expected to continue in the near future. By one estimate UV&EB penetration into flexo is about 25% and most presses purchased today have at least one UV&EB unit.

UV&EB Inks

UV&EB penetration into the graphic arts ink market spans the range of print methods, reaching 21,650 metric tons in 2005, up at over a 7% growth rate per year (Figure 7). Offset or litho inks represent the largest segment, reaching nearly 8,000 metric tons in 2005 with growth continuing at a steady 5% per year. Screen printing inks come in just behind litho, with UV inks used by a large share of screen printers. With high levels of penetration, UV screen ink represents one of the areas

Wood

North American consumption of UV&EB-formulated product for wood reached more than 19,000 metric tons in 2005, growing annually at about 8% (Figure 8).

Wood North America UV&EB Usage (Metric Tons)

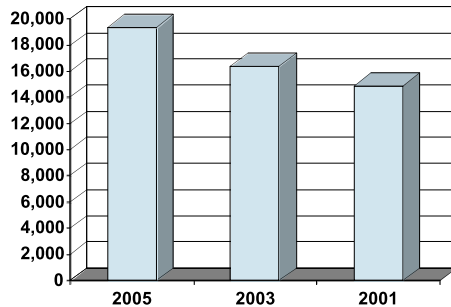


FIGURE 8

flooring demand from housing and home remodeling markets, and consumer preference for natural surfaces. One area receiving considerable attention is the potential for increased growth for UV on cabinets.

Well-established UV-clear finishes and fillers dominate the wood market, both reached more than 6,000 metric tons in 2005. Fillers, however, have slowed considerably and are now growing at about 2% a year while clears continue to make solid gains, up about 10% a year. Higher growth rates are forecast for stains, a relatively new application and winner of a RadTech President's Award at e|5 2006. Over the past couple years, UV for flooring has registered about 20% gains per annum, driven by overall strong wood

Plastic North America UV&EB Usage (Metric Tons)

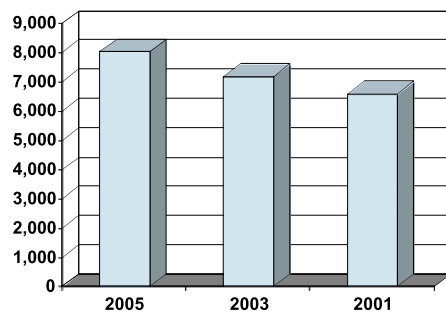


FIGURE 9

in this category (Figure 9). This application is declining, which is due to consumer preference and not related to the performance of UV. Projections of UV&EB for plastics annual demand excluding vinyl flooring show double-digit gains, as continued significant R&D work addresses adhesion issues. RadTech is offering a UV&EB for plastics adhesion guide, and CD compilation of recent papers. Please contact RadTech via email at uveb@radtech.org for copies.

Plastics

In plastic coatings, UV dominates the auto lens and reflector market and this continues as a growth application. Survey respondents indicate interior trim has been growing at double-digit rates over the last couple years, but this is from a fairly small base—high-growth rates are expected to continue over the next few years. Overall UV&EB plastics formulated product usage hit about 8,000 metric tons, but is fairly slow growing because of the predominance of vinyl flooring

Adhesives North America UV&EB Usage (Metric Tons)

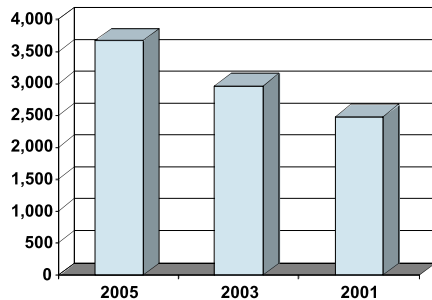


FIGURE 10

adhesives, this market remains small, although it continues to show double-digit growth and remains a promising technology.

Metal Coatings

Based on renewed interest and growing application development, metal coatings were featured for the first time in a dedicated session at RadTech's biennial e|5 Conference in 2006. Much of the interest revolves around potential in a variety of applications including pipes and tube, hardware, parts, and small metal products.

Metal Coatings North America UV&EB Usage (Metric Tons)

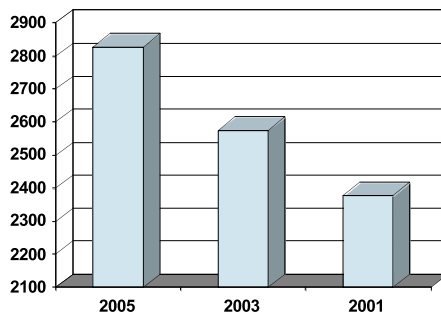


FIGURE 11

In addition, the application of UV or EB for coil coatings in North America and Europe is fast gaining recognition and represents a significant potential market for the technology. Metal coatings demand in North America reached nearly 3,000 metric tons in 2005 (Figure 11). While UV&EB demand for metal can inks and varnishes has slowed over the last few years, the development of new materials and interest from potential customers may offer higher growth rates in the future.

Fiber optics is bouncing back from the telecom crash a few years ago—and potential investment in fiber to the home promises significant potential growth in upcoming years. Survey respondents consistently rate stereolithography and solid modeling as potential high-growth areas, although the current usage in terms of formulated-product volume remains relatively small. Dental and electronics applications are low-volume, high-value areas that show solid continued market growth and continue to attract innovation efforts.

Adhesives

Total UV&EB adhesive demand reached just less than 4,000 metric tons in 2005, up just over 10% per year over the last couple years (Figure 10). While frequent predictions of rapid demand growth as a replacement for current technologies has yet to take place, UV&EB adhesives have registered solid growth over the last several years. Laminating adhesives account for the bulk of this category and are expected to continue double-digit gains for at least the next few years. Despite considerable efforts in the development of pressure sensitive

Application Growth

Other applications addressed in the survey are all registering solid growth.