

PRINTING INK
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**CHEMICAL
PROCESS
INDUSTRIES**

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TABLE 24.8 Industrial Coatings

<i>Ranking of industrial-finishes market</i>	<i>Ranking of resins in industrial finishes</i>
1. Automobiles	1. Alkyds
2. Wood furniture	2. Nitrocellulose
3. Containers and closures	3. Phenolics
4. Farm, construction, and mining equipment	4. Ureas and melamines
5. Sheet, strip, and coil coating	5. Acrylics
6. Appliances	6. Vinyls
7. Metal furniture	7. Epoxies

Source: Industrial Finishes: Outer Coat, Inner Coat. *CE*, 70, 90 (1963). Presumably, coatings for other products, such as toys, newsprint, utensils, and traffic paints, have smaller markets.

One hundred percent solid, or *fluidized-bed coating*, wherein the object to be coated is immersed in a bed of powdered, fusible plastic, is also important. At present it is most practical when used for coating small objects. *Plasma spray coatings* meet high temperatures and wear demands in space technology—a process in which extremely high-melting-point materials, including metals, are propelled to base materials such as brass, steel, and graphite, and certain reinforced plastics at high velocity after subjection to temperatures up to 30,000 F.¹ Multiple layers of glass flake in polyester resin produce hard, thick, easily sprayed, and resistant coatings for metal.² There is sure to be further development in the field of metal coating.

PRINTING INKS AND INDUSTRIAL POLISHES

Printing inks consist of a fine dispersion of pigments or dyes in a vehicle which may be drying oils with or without natural or synthetic resins and added driers or thinners. Drying oils or petroleum oils and resins are employed, although the newer synthetic-resin systems are finding great favor because they are quick-drying and their working properties are excellent. Printing inks have a large variety of compositions and a wide variation in properties.³ This is because of the great number of different printing processes and types of papers employed. The expensive new magnetic inks, developed for use in a number of electronic machines, are the keys to a data-processing system which, if successful, may curtail the use of some of the other *specialty inks*.⁴ Inks formulated with luminescent pigments achieve a superbright effect; dyes are melted into the resin and baked, and when hard, the material is easily powdered. Rhodamines, auramines, and thioflavins are the principal dyes used in heat-set inks.⁵

The *polymer polishes*, which have captured 85% of the total polish market, are increasingly popular both in industrial applications and the \$100 million household trade. Present-day polishes of the self-drying, water-emulsion types had their start in the leather industry in 1926 and, since then, have undergone numerous improvements. During

¹Plasma Arc. *CW*, Nov. 26, 1960, p. 45.

²Glass Flakes: Key to New, Strong Coating. *CE*, 67 (18), 162 (1960).

³Haines, Printing Ink Varnishes: Old and New. *Am. Ink Maker*, 38, 30 (1960).

⁴Magnetic Inks. *CW*, Mar. 12, 1960, p. 95.

⁵Development of Improved Printing Inks. *CW*, Apr. 9, 1960, p. 92.

World War II, shortages sparked efforts to replace waxes with alkali-soluble resins, which, in turn, have been replaced by acid-sensitive polymers. The picture is still changing, and the current "mix-and-stir" development may change the market picture considerably.¹

SELECTED REFERENCES

- Alms, E. A.: *Printing Ink Technology*, Chemical Publishing, 1959.
- Bosher, P.: *Emulsions: Theory and Practice*, ACS Monograph 135, Reinhold, 1957.
- Bentley, K. W.: *The Natural Pigments*, vol. 4, Interscience, 1960.
- Brannon, G. R.: *Film Properties, Film Deterioration*, Interscience, 1957.
- Bray, R., and W. W. Bradley: *Protective Coatings for Metals*, 2d ed., Reinhold, 1955.
- Crathfield, H. W. (ed.): *Science of Surface Coatings*, Van Nostrand, 1962.
- Dunberg, A. Ya., et al.: *Technology of Non-metallic Coating*, Pergamon Press, 1960.
- Edwards, J. D., and R. I. Wray: *Aluminum Paint and Powder*, 3d ed., Reinhold, 1955.
- : *Retardant Paints*, *Advan. Chem. Ser.* 9, ACS, 1954.
- Fox, P. M.: *Physical Chemistry of Paints*, Hill and Wang, Inc., 1963.
- Gardner, H. A., and G. G. Sward: *Paint Testing Manual*, 12th ed., Gardner, 1962.
- (ed.), N. G. (ed.): *Polyethers in Three Parts*, Wiley, 1962-1963.
- Johnson, P. L., and G. J. Dolgin: *Surface Coatings and Finishes*, Chemical Publishing, 1954.
- Kelton, R. F. (ed.): *Literature of Chemical Technology*, 16, *Printing Inks*, 26, *Coatings*, ACS, 1967.
- Kirkpatrick, R.: *Adhesion & Adhesives*, Elsevier, 1967.
- : *Paint Film Defects*, 2d ed., Reinhold, 1965.
- : *Shellac: Its Origin and Applications*, Chemical Publishing, 1961.
- Kirkpatrick, J. Jr. (ed.): *High-temperature Inorganic Coatings*, Reinhold, 1963.
- : *Industrial Printing Inks*, Reinhold, 1962.
- : *Practical Manual of Industrial Finishes*, Reinhold, 1960.
- Maters, C. R.: *Emulsion and Water-soluble Paints and Coatings*, Reinhold, 1964.
- : *Alkyd Resins*, *Plastics Applications Series*, Reinhold, 1961.
- , E. H., and W. M. Morgans: *Glossary Pigments, Varnish and Lacquer*, Chemical Pub., 1959.
- Matheson, C. R., and C. W. Sisler: *Industrial Painting: The Engineered Approach*, Reinhold, 1962.
- Matheson, J.: *Protective Coatings*, Wiley, 1941-1946, 3 vols.
- , P., and E. Sunderland: *Modern Surface Coatings*, Interscience, 1965.
- and Colour Chemists' Association: *Paint Technology Manuals*, vol. 1, *Non-convertible Coatings*, vol. 2, *Convertible Coatings*, vol. 3, *Coatings*, Reinhold, 1961-1963.
- : *Solvents, Oils, Resins and Driers*, vol. 3, *Convertible Coatings*, Reinhold, 1961-1963.
- : *Manual*, 2d ed., U.S. Dept. Interior, Bureau of Reclamation, 1961.
- : *Paints and Varnishes*, OTS Selective Bibliography, SB-518, U.S. Dept. of Commerce, 1963.
- , D. H.: *Surface Coating Technology*, Wiley-Interscience, 1965.
- , R. L.: *Treatise*, Dekker, 1967.
- , I. C.: *Resin Technology: Formulation, Calculations*, Wiley-Interscience, 1962.
- , I. C.: *Paint Flow and Pigment Dispersion*, Interscience, 1964.
- , H. F.: *Organic Coating Technology*, Wiley, 1961, 2 vols.
- Shannon, R. B.: *Hot Organic Coatings*, Reinhold, 1959.
- , E.: *Fundamentals of Paint, Varnish, and Lacquer Technology*, *Am. Paint. J.*, 1957.
- , E.: *Acrylic Paints*, Sterling, 1966.
- , G. P. A.: *Introduction to Paint Chemistry*, Barnes & Noble, 1967.
- , T. A.: *Industrial Paints: Basic Principles*, Macmillan-Pergamon, 1964.
- , W., and E. G. Bobaleck: *Organic Protective Coatings*, Reinhold, 1953.

ADDENDA

- : *Kaolin, Paper Coating*, *CEP*, **63** (3), 57 (1967).
- : *Protective Coatings*, *I&EC*, **59** (8), 42 (1967).
- : *Paper Coating Improvements*, *CEP*, **63** (3), 45 (1967).
- & Pascal: *Titanium Dioxide*, *CEP*, **63** (3), 52 (1967).

—: *Resins Race Resin Race*, *CF*, Jan. 20, 1962, p. 103.