Top Product Developments, 1984 to the Present

By Harold Hower, Technology Publishing/PaintSquare

The past 25 years will likely be seen as the Golden Age of information technology, when revolutionary advances were made in the storage, manipulation, and distribution of data, and the miniaturization of devices used for these purposes. So we now have a computer/TV/movie screen/telephone/radio/camera that we can hold in our hand, with applications too numerous to describe. It's mind-boggling when you compare the state of information technology in 1984 with this technology today.

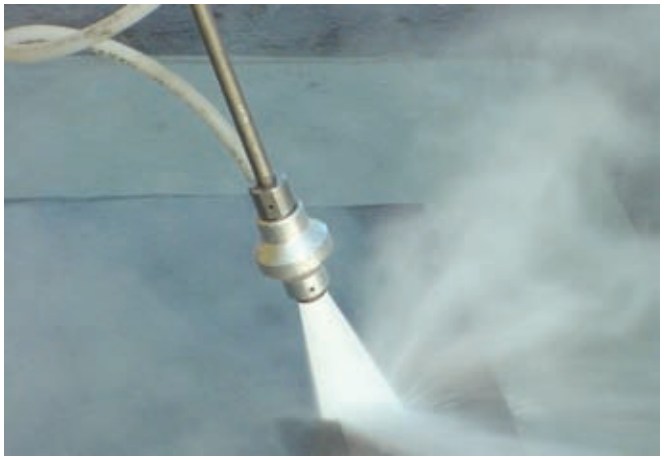
In the protective and marine coatings industry, as in similar industries, we have made great strides in product development, as well, although not as dramatically as information technology. There is no doubt, however, that information technology aided in our industry's product development and is incorporated into many products' features.

What follows is a generic description of top new products introduced since *JPCL* began publishing. The selection of these products was made by Brian Goldie, *JPCL*'s Technical Editor; by several of *JPCL*'s Contributing Editors; and by readers who responded to a survey about top products. The 10 product types most frequently mentioned and described by our editors and readers are featured here, as well as a number that rated as Honorable Mentions.

The Top Products

UHP Waterjetting Systems

Ultra-high pressure (UHP) waterjetting, conducted at 40,000 psi (170 Mpa, 1700 bar) or higher, has given the protective and marine coatings industry an effective secondary surface preparation method to remove coatings, rust, and debris from steel and concrete. It is considered "secondary" because it does not impart a profile to new steel and concrete; it is normally used, therefore, in maintenance operations rather than in new construction.



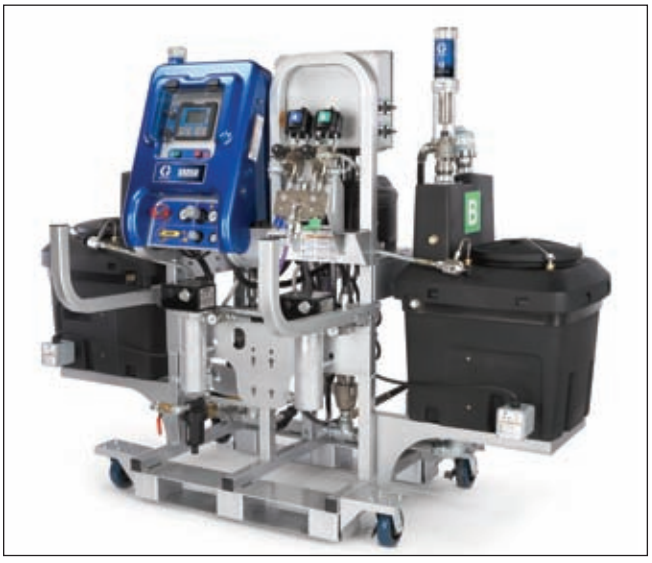
Waterjetting: Courtesy of NLB (JPCL, *February 2004, p. 23)*

UHP waterjetting has many advantages, including reduction in the waste generated during surface preparation, elimination of dust and sparks, and the removal of soluble salts (chloride nests) from the pits of rusted steel surfaces.

UHP waterjetting is especially useful on offshore oil platforms because it avoids the need to transport vast amounts of abrasive to and from the platform; protects the sea from abrasive residue; removes chlorides deposited by the salt-laden air; and eliminates the sparking of abrasive blasting that might lead to fire and explosion.

Plural-Component Spray Equipment

Plural-component spray allows the application of high or 100% solids coatings that cure immediately upon catalyzing. These coatings thereby become another avenue for achieving VOC compliance at very low levels, while at the same time, they eliminate some of the dangers of solvent toxicity.



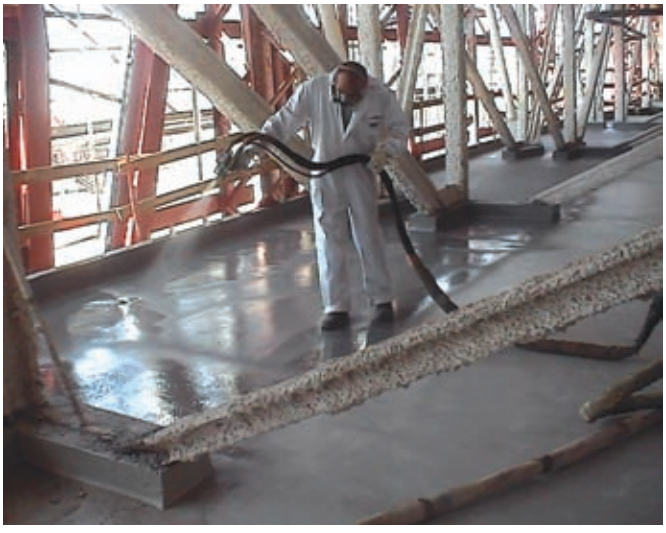
Plural-component system: Courtesy of Graco Inc.

Plural-component spray equipment has proportioning pumps that allow metering and delivery of each coating component so

that a fixed, predetermined ratio of the materials reaches the spray gun, which has an impingement mixing device to combine the components before they are sprayed onto the surface being coated. Key to the equipment is accuracy and consistency of proportioning, since "off-ratio" materials will generally fail prematurely. Much progress has been made in the development of this equipment so that it is now more reliable and easier to use.

Polyureas

Polyureas are very high to 100% solids materials that have contributed to lowering the VOCs of coating materials while providing very strong performance capabilities. The main advantages of



*Applying polyurea: Courtesy of DeNeef Technologies (*JPCL*, February 2005, p. 18)*

polyureas are excellent mechanical properties; weatherability, even in extreme environments; fast cure, relatively unaffected by humidity and temperature; and excellent adhesion and flexibility, even at low temperatures.

This technology, developed in the late 1980s, is a two-component coating consisting of an aliphatic isocyanate prepolymer and a primary amine-terminated resin and chain extenders. So-called "pure" polyureas have no polyols, as polyurethanes, their cousin, do. If polyols are present in polyureas, they are called "hybrid," not "pure" polyureas.

Sponge Blasting

Sponge blasting is carried out in air abrasive blasting systems modified to use sponge as the abrasive. The sponge is a polymer matrix that, in some cases, has abrasive particles, such as garnet, embedded into it.

Without the embedded abrasive, sponge blasting is effective in cleaning applications, for instance, in cleaning a surface that has been blackened by smoke in a fire. When abrasive is embedded,

Sponge blasting: Courtesy of Todd Pacific Shipyard
(JPCL, November 2005, p. 12)

sponge blasting can cut steel sufficiently to create a profile and can be effective in coatings removal.

Sponge blasting reduces the amount of dust generated by abrasive blast cleaning operations when conventional abrasives are used.

Certification Programs

SSPC has developed and operated a Painting Contractor Certification Program (PCCP) since 1985 to elevate the quality of paint contracting operations and to diminish the negative impact of low bidding, incompetent contractors, especially in public works jobs, where the work often has to be awarded to the low bidder.

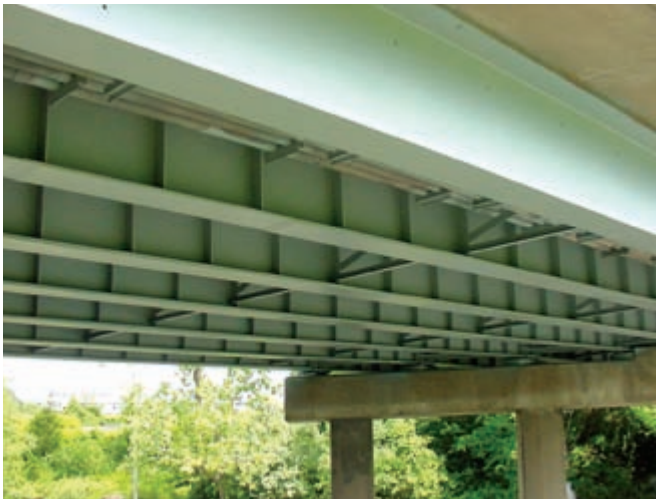
This successful program requires field audits of contractors' operations to assure they have the appropriate levels of quality, administrative controls, and safety.

NACE has operated a coatings inspector training and certification program since the early 1980s. This program has increased the awareness of coatings inspection and its value in assuring the quality of coatings' work. The program establishes a process for improving the knowledge and professionalism of coatings inspectors. In recent years, SSPC has also established inspector training and certification programs.

Polyaspartics

Polyaspartics can be considered a new or specialized class of aliphatic polyureas. They are based on the reaction of polyaspartic ester compounds (a type of secondary aliphatic amine) with polyisocyanates. These form moderately fast-curing coatings with good outdoor weathering, long pot life, and good abrasion and corrosion resistance.

The unique structure of the polyaspartic ester allows for a

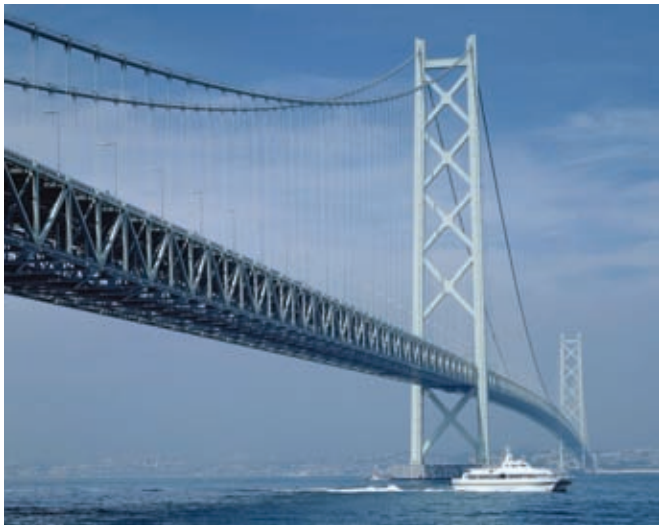


MCU zinc/polyasparatic: Courtesy of Sherwin-Williams (JPCL, October 2006, p. 46)

range of products to be formed with differing reactivities, gel times, and, thus, application windows. Similar to polyureas, polyaspartic technology can be combined with polyurethanes to form hybrid coatings that can yield a range of properties to suit differing applications.

Fluoropolymers

Fluoropolymer coatings were originally used as factory-applied, heat-cured finishes for architectural metal such as aluminum. More recently, however, fluoropolymers and their blends with other resins such as polyurethanes have become available for field application with conventional equipment.



Fluoropolymer coating: Courtesy of Dai Nippon Toryo Paint and AGC Chemicals

These coatings provide superior weathering durability and exhibit excellent color and gloss. They are therefore very useful

in high-end topcoat markets. Very recently, waterborne versions of fluoropolymers have emerged so that these coatings can be used where very low VOC materials are required.

Epoxy Technology

High solids, 100 percent solids, and waterborne versions of epoxies, developed during the past 25 years, have maintained the technology as the workhorse generic type in protective and marine coatings markets in the face of ever diminishing VOC limits. Throughout the past 25 years, epoxy technology has developed steadily and surely, with a focus on new curing agent types to impart better and specialized properties. Epoxies are very effective tank linings, in applications from drinking water tanks on land to ballast tanks on ships at sea, and they see wide use as atmospheric coatings to provide barrier protection against corrosion and mechanical damage on steel and concrete.

Electronic Gages

Paint application specifications, such as SSPC-PA 2, require very large numbers of quality control measurements to assure consistency of film thickness. Results of these measurements must be recorded and kept on file by coatings inspectors in case there is premature coatings failure. Today, this job is simplified and made productive by electronic gages that store data and allow its download into computers.

Like digital devices in other industries, quality control gages for coatings inspection become more sophisticated and powerful year after year.

Other Digital Devices and Systems

Many readers, responding to *JPCL*'s email survey about new products, cited various advances in information technology as top products—general advances such as computers, the internet, cell phones, and GPS systems, as well as advances in this area that are more specific to the coatings industry, such as the internet portal PaintSquare, which is also the web site of this journal.

It goes without saying that digital devices and systems pervade our working as well as our private lives; and the protective and marine coatings industry could not have advanced to its current level without these products.

Honorable Mention

Other products receiving some mention from readers and editors included the following.

• Field-portable steel grit recycling machines. These machines are significant because in lead paint removal operations on large structures, they have reduced the quantity of abrasive

needed to remove coatings and clean the underlying steel, and therefore, they have reduced the volume of hazardous waste generated by these operations.

- Field containment systems. These systems, which can be made airtight, reduce the impact of coatings work on the public and the environment.
- SSPC visual standards. These standards have simplified the assessment of surface cleanliness achieved with a variety of tools and methods: wet and dry blast cleaning, hand- and power-tool cleaning, and waterjetting.
- Flash rust inhibitors. These products enable greater surface preparation productivity by allowing blast-cleaned steel surfaces to remain untopcoated for 24–96 hours. Otherwise, requirements to blast and coat before flash rust develops means that one operation is interrupted to allow the other to commence, a very inefficient practice.
- Tin-free antifouling technologies. Replacements for tributyltin (TBT) antifoulants on ships' hulls, including self-polishing, copper-based systems, and low-energy, non-biocidal systems, have stopped the damage that TBT has caused to the marine ecosystem.
- Polysiloxanes. Introduced in the 1990s, the organic-inorganic hybrid polysiloxane technology has provided very high quality esthetic properties through UV durability and very good corrosion resistance.
- Robotic waterjetting and wheel blasting machines. These so-called "crawlers" have found use on large, relatively flat surfaces, such as ships' hulls and storage tanks, where they clean surfaces and remove debris very productively.
- Wet blast equipment. This equipment combines the virtues of water and abrasive—effective cutting and scouring by the abrasive and dust suppression by the water. Numerous advances in the various types of this equipment have been made in the past 25 years.
- Cementitious epoxy resurfacers. These materials provide a level surface for topcoating cast-in-place and pre-cast concrete. They bond well to the surface and require no further surface preparation.
- Bristle blasters. This new power tool achieves a profile similar to that achieved by air abrasive blast cleaning in a single step and cleans steel to a high degree of cleanliness.

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HOUSTON OFFICE
260 NORTH SAM HOUSTON • PARKWAY EAST, SUITE 310 • HOUSTON, TX 77060 • 1.281.293.0839

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