Finish Adhesion, Durability Critical

Surface finishes on printing presses are both functional and decorative. It is important that the finishes hold up under continuous use and sometimes harsh conditions. A press is the focal point of the pressroom, and a sharp looking unit can dress up an otherwise drab working area. Here is how one of the world's largest press manufacturers produces a finish on its products that looks good and lasts a long time.

G oss printing presses have been built for over a century. The company was founded in 1885 by two brothers, Frederick and Sam Goss, who discovered that by reversing one cylinder of a poster press they had built, they could make it capable of printing both sides of a newspaper simultaneously. The innovation led to the development of the first "straightline" press, which quickly gained wide acceptance, because it offered higher production and easier operation for newspaper publishers and printers.

Now manufactured by Rockwell Graphic Systems, a unit of Rockwell International Corporation, Goss presses are used today by two-thirds of U.S. daily newspapers and in more than 95 countries around the world. They are used for printing in Polish, Chinese, Arabic, Portuguese, and many other languages, in various paper widths, and are available with a variety of inking systems and options.

The presses enjoy a reputation in the printing industry for their high quality and innovative features. Innovations have included the development of vacuum casting equipment for stereotype plates, spiral bevel and helical gears, and high-speed presses incorporating elaborate computer control systems.

Some of the modern presses, such as the "Colorliner" and "Matic Color," can print 70,000 to 75,000 broadsheet



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newspaper forms per hour. The presses, which are comprised of integrated, module "building-block" components, are configured to meet custom requirements for color, paging, operation automation, and management information.

Goss presses can be up to 25 ft in height and 160 ft long, weighing more than several tons. Some presses, depending on the options, can take almost a year to manufacture. The presses are expected to operate reliably, almost around the clock, often for 20 years. As a result, it is not unusual for a new press to require an investment of several million dollars.

Finishing First

Because of the size and complexity of the equipment, building Goss presses is a complicated process. Most phases of production—from the machining, boring and grinding of metal castings used in the structure and operations of the presses, through the application of a finish—take place in a 550,000 ft² manufacturing facility in Cedar Rapids, IA. Quality assurance plays an important role in each phase of production. Rockwell uses only high quality materials and meticulous care in the production of each press.

A printing press is among the most demanding applications in which a coating system can be used, because of the stringent cleaning procedures and strong chemicals required to remove stain-producing inks from the equipment after each press run. Humidity can also undermine the finishing process by causing flash rusting during production. As a result, a high-performance finish with outstanding adhesion and durability is required. A phosphorizing agent is applied by conventional spray to clean off oil and grease, and ensure proper coating adhesion.

After the phosphorizing agent is applied, heavy frame and small machined components are assembled in two separate areas. The presses are then constructed and electrical components are installed. Each unit is tested thoroughly, and those that pass the test are disassembled so that the components can be finished. Electrical components, frames, side covers, stairways and platforms are prepared and painted in one of five custommade 20-ft by 20-ft by 20-ft spray booths.¹ Surfaces are prepared with hand tools, such as electric sanders and buffers, to receive a three-coat finish, designed and formulated to protect the cast metal and retain its appearance during years of constant operation and frequent cleaning.

The coating system² is comprised of an industrial wash primer to promote adhesion, a polyurethane sealer³, and a urethane topcoat⁴. The process complies with volatile organic compound (VOC) standards and provides a highbuild, high-gloss finish similar in appearance to an automotive finish. "The appearance of the press is essential because customers, prospects and users notice it first, and relate it to the quality of the unit," said Douglas Clark, general foreman, finished products for Rockwell Graphic Systems.

System Application

Coatings are applied using high-volume, low-pressure (HVLP) spray equipment, to minimize waste and provide a consistent spray pattern without runs or dry spots. The process is applied by 22 painters operating during two daily shifts.

The wash primer is a fast-drying, acidcatalyzed vinyl washcoat. It dries to touch in 10 min at ambient temperatures and can be coated in less than 60 min. The primer comes in a light, translucent green so that the painters can visually inspect the surface to assure complete coverage.

The sealer is a 3.5, VOC-complying, two-component polyurethane coating. It provides excellent adhesion to cast iron and steel, and serves as a base coat with excellent adhesion for a full gloss topcoat. The sealer, which enhances the chemical resistance of the coating, dries to the touch in 30 min at ambient temperature, and can be coated in 60 to 90 min.

The two-component, high gloss urethane topcoat provides outstanding performance properties, such as: Hardness, adhesion, mar/abrasion resistance and durability. The topcoat is resistant to chemicals and stains, which enables most inks to be quickly cleaned

- ²Manufactured and supplied by Sherwin-Williams Company, Chicago, IL
- ³Prolane[®] Plus Sealer, Sherwin-Williams Co.
- ⁴Prolane[®] Plus Enamel, Sherwin-Williams Co.



Coatings are applied using HVLP spray equipment to minimize waste, and provide a consistent spray pattern with no runs or dry spots.

off the presses without damage to the finish, helping to minimize downtime. The topcoat comes in numerous colors, including custom-made.

"We had one customer who wanted his press to match the color of his wife's Mercedes Benz," Clark said. Another customer from a newspaper in the Middle East required a press in an unusual shade of green so that it would be significantly different from the green used on the country's military equipment. Clark said the company has been able to provide every color that has been requested.

Quality Testing

Some parts used in Goss presses are finished by vendors off-site prior to assembly. Because of this, it is important to be able to obtain coatings in precise matching colors at locations all over the nation. Rockwell's supplier has more than 2,000 stores around the nation, with computerized color matching technology, so the company can match colors and coatings for the same press at different locations.

Sample colors are blended by the supplier. Once a color standard has been accepted by Rockwell and its customer, a sample panel (kept frozen to prevent color drift) is used as a master standard for all batches mixed of the color.

Each batch is tested at the blending station with a gloss meter, spectrophotometer, and other equipment, to help keep colors within tight shade requirements. Sample panels of each batch are shipped to Rockwell for approval before the coating is sent to a nearby supply store, where it is held in inventory until required for use.

Testing doesn't stop there. After application of the coatings, Rockwell uses a microprocessor⁵ to measure wet film thickness to assure uniform coverage. When the finish is dry, an adhesion tester⁶ is used, because adhesion is of crucial importance to long-term performance.

The adhesion tester uses the pull-off principle for measuring bond strength. A loaded spring exerts specific pull on an aluminum "dolly" adhered to the coating surface. When the adhesive has cured, the claw of the instrument is placed under the dolly head. A spanner nut on top of the instrument is tightened until the test poundage is reached, or the dolly is pulled off. The pull-off force required is indicated on the adhesion tester's engraved scale. ⁵E/Tometinistringosystem Prabatevel/failed to wassethe addression test, according to Clark. Like the presses it protects, the finish has proven to retain its attractive appearance and withstand many years of rigorous use in the field. o

¹Built by JBI, Inc., Osseo, WS