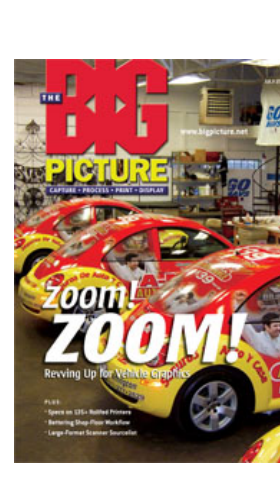


Garnering Better Shop-Floor Workflow

How five shops have re-arranged their equipment array, and people, to expedite the flow of materials

By JAKE WIDMAN

"Workflow" has been a hot topic and buzzword for about a decade now. From PDFs to JDFs, preflighting to post-processing, the focus has been on streamlining the flow of digital data. But there's another aspect to workflow that's much older, if less sexy, and that's streamlining the flow of physical materials from station to station on the production floor.

Printing, after all, is still a manufacturing business that processes raw materials through a series of machines to make a physical product. In an industry in which margins are becoming ever slimmer, finding the best arrangement of those machines to support the manufacturing process is critical.

This topic becomes even more critical, of course, as shops look to expand their printing arsenal by duplicating their current equipment, or by adding larger equipment, such as a flatbed machine. The following five print providers have wrestled with that question and share some of the techniques they've used to make their workflow work.

RESOLUTION GRAPHICS
Designing for Speed and Convenience
Location: Albuquerque, NM
Time at current location: 1 ½ years
Size: about 10,000 sq ft (shop area)
Equipment: "There are about nine pieces of equipment on the floor, everything from an Epson Stylus Pro 9600 to an Océ Arizona T220 UV flatbed to a Nur Expedio 5000 16-ft printer."

Resolution Graphics has been in business since 1997, and until a couple of years ago the company operated out of a 4000-sq ft space. "We were really crammed in," says owner Chris Ruddy. Things only got worse in 2000, when the company "got into the really big machines—such as the Nur Salsa 3200 and Nur BlueBoard HiQ," Ruddy continues. "Our space was inadequate for a long period of time, but it allowed us to think about exactly what we would want."

Finally the opportunity came to do just that. "We had the new building built for our system, for our specific workflow—from the time a job comes through our front door, to accounting, to the art department, to the printer that will produce it, to finishing, to shipping or customer pickup, even the way materials enter our facility," says Ruddy. For example, the structure has one regular loading dock, but it's also equipped with two drive-in docks because "we have to have the ability to do vehicle wraps," Ruddy says. "We've even brought an inter-city bus in the shop for a wrap."

After the construction came the moving in. "We arranged our equipment in such a way that everything's in a line," Ruddy says. "The art stations are right on the end, so the artists are very accessible to the machine operators."

"When you do billboards, the issue becomes speed and convenience," Ruddy continues. The old Resolution Graphics building only had about 15 ft of space behind the Expedio (a 16-ft-wide UV rollfed printer), so the operators would have to wait for an entire billboard to come off the machine and onto the roller, then turn the roller 90 degrees and unroll the billboard again to finish it.

The new building, however, has about 80 ft of space off the back of the Expedio—"We were very specific about where we placed it," emphasizes Ruddy. "The printer's output doesn't need to be spooled up any more—it just flows right out the back and onto the floor, where it can be finished."

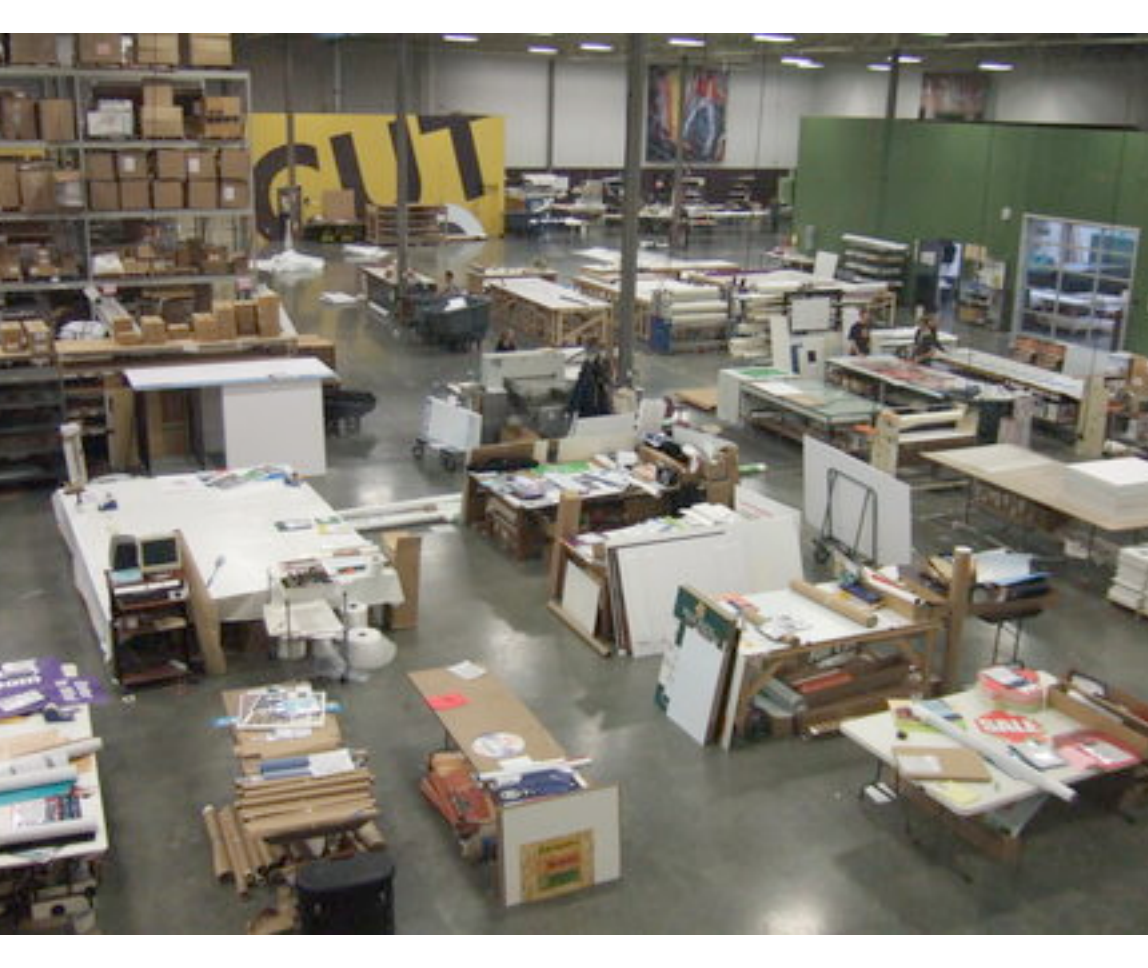
That arrangement also has led to the choice of Leister hot air welders for seaming rather than big seamers. "Big seamers are ordered to the width you want and fixed in place," Ruddy says. The Leister units, by contrast, are very small ("about the size of a really small dog") self-propelled robots and can handle any job from 2 ft long to 500 ft long.

The new building is working out well except for one problem—one that most businesses wouldn't mind having: "We anticipated everything but our growth," says Ruddy. "We'll probably add another 5000 sq ft and put in another Expedio. We'll probably put the new one 80 ft away from the first one, across the shop, and both machines will feed into the same area" for finishing.

Ruddy offers this piece of advice for any print provider considering a move or a reconfiguration of the shop floor: "Consult with your shop people extensively. They know exactly what they want to have."

FERRARI COLOR
Interaction and Integration
Location: Salt Lake City, UT
Time at current location: about 4 years
Size: 60,000 sq ft
Equipment: Durst Rho 350R, 160, and 600 Pictor inkjet printers; HP Scitex XL 1500 16-ft printer; Durst Lambda photo printer, plus laminators, routers, x-y cutters, and more.

Ferrari Color has its roots in the world of old-fashioned color labs. "We came out of that lab environment—separate rooms, walls everywhere," says Marty McGhie, vice president of operations (who also authors this magazine's "Business and Management" column). "Traditionally, photo labs were set up with multiple rooms because of the need for darkrooms for enlargers and processors. Hence, the typical photo lab layout resembled somewhat of a rat's maze in terms of multiple rooms throughout the shop."



Over the years, the different shops grew together into one workplace, but the space was still divided up: Ferrari had all of its wide-format equipment and work in one facility, and photo printing in another.

When the time came to plan their move into new accommodations, "we visited a lot of shops," says McGhie. "You could tell that they were designed by simply accommodating equipment. So we asked ourselves, 'What if we just opened up the entire warehouse?' My business partner, Dan Spangenberg, was pretty insightful. He drew up a floor plan and we all looked at it and approved it."

The result is basically one big common area in which the workflow moves counterclockwise. "You can stand up in a cubicle and see any place on the entire floor," describes McGhie. Not that everyone liked that visibility right away: "Honestly, at first, some people weren't really happy." But the togetherness served its purpose. "We want everyone integrated into the production process," states McGhie. "Now there tends to be a lot of interaction between the customer-service reps and the digital folks"—they share the same preflighting workstations, for instance.

The togetherness didn't extend to everyone, however. "We went out of our way to screen the sales reps from the production floor," says McGhie. "We want them out selling. There's a mezzanine for their offices, with windows overlooking the plant floor. The project coordinators can tell them what's going on if they have questions."

And because of growth, there are challenges to maintaining that big open space. They've had to find space for cubicles for project coordinators, special project managers, and so on, sooner than expected. But they make sure to add them around the fringes of the workspace they've already defined rather than to infill. "It's tempting to fill in idle space," McGhie acknowledges, "but you know that's going to be taken by workflow as we continue to grow."

"Would we have done anything different? Sure. But we're pretty happy. There's a mental shift—everyone's involved, everyone has access. The digital people's mentality was, 'I'll just sit in this room until someone needs me,' in the 'sacred den of digital imaging.' Now the production person will come to them and say, 'Come see if you like the color on this.' You see people interacting more than before."

PRATT CORPORATION
Single-Piece Orientation
Location: Indianapolis, IN
Time at current location: almost 2 years
Size: 300,000 sq ft for entire building, 65,000 of which is manufacturing space
Equipment: 2 Inca Columbia Turbo flatbed inkjet printers; 4 multicolor in-line screen presses, including a new Thieme XL 5000 6-color screen-printing system; and several single-color presses.

Before its last move, Pratt Corporation was really departmentalized, says Mark Wallace, the company's vice president of operations. Every task had its own area: screen printing in one place, cutting in another, and so on. Driven by a commitment to "lean manufacturing," however, the company's new layout has changed all that.

"Lean manufacturing" is a term coined by management author James Womack to describe an idea that originated with Toyota. "In industries other than printing," says Wallace, "it's pretty prominent. In the printing business, though, there's not a lot [of it going on]." But both Wallace and director of manufacturing Russ Greene brought experience with the approach when they came to work at Pratt. "All lean does is try to get rid of waste," says Wallace. "Inventory is reduced, quality is improved."

The lean manufacturing initiative was implemented fairly recently. "A year and a half ago, there was a lot of waste," recalls Wallace. The company had moved into a new building a couple of years prior, but operations were still departmentalized.

"Traditional manufacturing is all about batch flow," points out Wallace. You print a batch, move it en masse to the cutter, cut the batch, put it all in inventory, then pack up the batch when needed. "In lean thinking, inventory is evil," says Wallace. "You want to have single-piece flow rather than batch flow."

Greene supplies the details: "We looked at our processes and rearranged equipment out of functional cells into workflow centers. For example, what's the next operation on items once they go downstream from the Thieme printer? We found that 80% of the time, the next operation was cutting. So we moved two cutters right next to the press. There's no longer any cutting equipment in the previous cutting area." Their process analysis revealed that materials generally followed that same 80/20 rule: 80% of the material went to 20% of the equipment. So they tried to position the equipment to address the 80% and just deal with the other 20% as required.

Greene offers another example of repositioning equipment to support a single-piece workflow. "We sometimes make thousands of banners for a fast-food restaurant chain as part of our P-O-P business. The way we used to do the job was to print 2000 banners and take them to the hemming center on pallets, then to roping, then to the grommeting center, and then store them until the client wanted them. It was a 2-week process.

"Now, we print a banner, hand the item to the hemmer, then the roper, then the grommeter, and then it goes right to shipping. It takes us 3 days to complete the same order."

This single-piece orientation is affecting more than just the placement of equipment, says Wallace. "It's also driving the move at Pratt away from screen printing and toward digital printing. That's why our digital printing has grown over the past year and a half."

CSI
Planning from the Start
Location: Falls Church, VA
Time at current location: building 1, 5 years; building 2, less than a year
Size: bldg 1, 18,000 sq ft; bldg 2, 21,000 sq ft
Equipment: Inca flatbed wide-format printers ; Durst Rho UV curable printer, Gandinnovations Jeti 3300 solvent roll-to-roll grand-format printer; Océ LightJet 430 and Durst Lambda photographic printers; plus routers and other equipment.

CSI operates out of two buildings, one in Falls Church and one in Fairfax, VA, both suburbs of Washington, D.C. The buildings are a mile and a half apart—close enough to make it a short trip, says vice president Sean Haley, but far enough to still require loading and unloading a truck.

CSI has been in the Fairfax building only a few months, and "we got to plan for how the building was going to fit with the equipment," recounts Haley. The wide- and grand-format printers are located in the new building, and "we designed the space out specifically for those presses."

The building is divided roughly into two halves, with one side—about 36 x 130 feet—devoted to the grand-format printers. Also on that side is the sewing area. "In the grand-format part of the business, we're doing things up to 100 ft long. The sewing is co-located with the Gandinnovations Jeti printer, so the output flows right into sewing and then into shipping and receiving."

"A big part of the planning was how to keep the smell contained," Haley recalls. They first began using the Jeti before they had the new building—it was housed in a space across the street from their old building, and there was a gym next door. The gym owners complained that their customers were having issues with the strong smell of the solvents—it turned out the wall between the gym and the shop was not sealed all the way to the top, and the fumes were getting over the gap and settling into the ceiling of the gym. "So when we built out the new place, we knew we had to have a good venting method," says Haley. "We built a hood around the Jeti, put plastic sheeting around the hood, and put it in the back of the room."

In the other half of the building is an 80 x 100-ft area with the flatbed printers plus a couple of additional rooms. "Our Inca and Rho are in one large room, and the routers are in separate rooms right next to it. We put in a floor-to-ceiling wall between them to keep the dust from the router away from the printer. And then at the end of that is our wood shop, where we do things like box mounts and custom framing. It's at the far end of the building because of the dust, too, which conveniently also puts it near the loading dock."

The router rooms and wood shop are the only separate rooms in the entire workspace (aside from the basic half-and-half division of the building). Those rooms are also soundproofed with an extra layer of insulation. Furthermore, CSI built two 8-ft-wide windows with special soundproof Plexiglas in the wall of the router room. Visitors and clients are always interested in watching the router, says Haley, and that way they get to watch it run without having to hear it.

Haley mentions one other advantage to working in large, undivided spaces: It means people can help each other out when needed. On the grand-format side, for example, the sewing personnel can help move a job from the Jeti to the sewing area. But they've taken the concept even further on the flatbed and router side: the personnel there are actually cross-trained, so that the same person can set up a print job and then go help with the router.

POINT IMAGING
Ganging Like Areas of Technology
Location: Hobart, IN
Time at current location: about 2 ½ years
Size: 33,000 sq ft
Equipment: Six printers, including an HP Scitex TurboJet and 3 EFI Vuteks, plus coaters, laminators, cutters, and more.

Point Imaging made the move into a new space about 2 ½ years ago. "Certainly, I analyzed our old facility before the move," says Kevin Huseman, president. "Much of the production tension was just because we grew so darn fast year over year. When we first moved into our old plant in 1995, we had no idea what we were going to do with all the space."

Huseman had a couple of principles for the layout of the new building: "In the design of our new plant, we wanted to do what we could to support unidirectional movement in manufacturing and to gang together areas of like technology." The result is that one third of the building is arranged to support rigid substrate printing, the center supports 16-foot printing and edge finishing, and the remaining third accommodates higher-speed, narrow-format production. Attention to these issues has helped the company's output-per-person-hour rise from about 100 sq ft 3 years ago, in their old space, to 300 sq ft today.

The layout of the shop has not fundamentally changed since the company moved in. While it worked well for the first year and a half, says Huseman, since then they've added the TurboJet and a Vutek QS3200. "We put them where they'd be least disturbing to the rest of the plant," Huseman recalls, "but the new equipment has sort of set us on our ear. We're going to be revisiting our floor plan." Twelve to 18 months from now, he says, he expects the plant will again look different.

Reflecting on his experience, Huseman has some thoughts on floor plans and equipment layout in general: "Beyond the manufacturing floor, make sure that you intelligently design inbound and outbound traffic areas, storage areas, and so on," he advises. "Shops tend to get hung up with the cool stuff they make things with and don't pay enough attention to the support systems. We maybe could have done better with our materials handling, packaging, and collating areas, for example. It strikes me how advanced our industry's equipment is, but how archaic our business systems are."

He also recommends taking time to address people flow as well—issues like how easy it is to get to the copy machines. "It's amazing how much wasted movement goes on," he says, "and every touch, every movement cuts into margins. You're going to continue to see gross margins get squeezed; the only route to stay alive is to extract costs."

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