The Growing Interest in Computers

The Computer Revolution Has Hit the Construction Industry as Contractors Get on the Electronic Bandwagon

Do you plan to buy a business computer in the next year? According to one recent survey of construction contractors, 95 percent of your competitors do—70 percent of whom have at least one computer already, including 30 percent who own at least five.

“Interest in computers cuts across all types and sizes of construction companies,” says John Smith of accountants Arthur Andersen & Co., conductor of the survey. Smith told a recent IBM Construction Executives Conference that, “contractors are now in the ‘awareness’ stage, creating a bandwagon effect for computers. The next stage is experimentation, followed by proliferation. By 1990, even today’s exotic technologies like computer-aided design will become standard.”

The construction industry’s rush into the Computer Age—which experts all agree is upon us—is bound to shake up long-established ways of doing business. But how? Clearly, company’s own internal operations — accounting, estimating, billing — will be profoundly impacted.

But as all parties gain easy access to project-wide information once available only to others, many are asking whether the influx of computers will affect the relationships between owners, designers and contractors by changing the way construction projects are managed.

Past is Prologue

History is replete with examples of new technologies that have changed the construction profession. In cen-
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turies past, for example, the increasing sophistication of building methods saw owner-supervised construction give way to master builders.

Or consider the use of written contracts, a development springing from the need to clearly describe increasingly complex work responsibilities. (It is not even until 1911 that the American Institute of Architects introduced the first standardized owner-contractor agreement!)

And even more recently, in our own post-war era, changes in building technology have profoundly altered the face of the industry.

As AWCI general counsel McNeill Stokes writes, “No single general contractor can keep up with every development. For that reason, most construction work today is performed by specialized subcontractors who can install building components faster, better and cheaper than the general contractor could with his own forces. The general contractor is no longer the traditional master builder of old, but is often just a broker of subcontractors.”

Interior finishing contractors need not be told the growing use of subcontracting has created new situations—such as poor coordination, slow payment and inequitable subcontracts—that the industry is struggling with even today.

And now that computers promise to be the newest technology sweeping the industry, what do the cards hold for contractors? The present structure of the construction industry is based upon a sequential flow of information among parties: the architect must go to the engineers and builders for feasibility data; the general contractor must go to his subcontractors for labor and material prices. But with computers, all that may change.

Architects could test stress loads in their own offices by computer; general contractors could pull together up-to-the-minute prices from several computer subscription services already available. And these are just two examples of the instantaneous flow of information computers can provide.

So will computers tomorrow change
the way construction projects are managed today?

Designing and Building

Computer-aided design—or CAD—is the hottest new buzzword in the engineering and design professions. Why? Because the most exciting advances in construction applications for computers are being made in this area.

Elbert Ray, president of Louisville, KY., consulting engineers Proctor-Davis-Ray, last year invested nearly $1 million in new computer systems. Having seen his firm’s workforce double the past twelve months, and its profits up 500 percent, Ray is enthusiastic about developments in CAD technology.

“We broke even after cutting our engineering and drafting time in half, and have gained since then,” Ray told the IBM Construction Executives Conference. “Our revenue is up 40 percent. And it only takes 34 days to train our people, two months to get them up to average proficiency, and only six months to make them experts.”

CAD systems already on the market can store common symbols in their memory and enable the drafter to create drawings—turned out by high-speed printers in eight different colors—which meet all ANSI requirements and are uniformly better than those produced by hand. Designs can be modified instantly on a screen monitor, and then tested for stress and other use requirements by computer models—eliminating any need for redrafting by hand.

“Before long, computers will do away with hard copy altogether. Blueprints will become obsolete, as engineers and contractors bring their computer work stations to the jobsite and refer to the design on their screen monitor,” said Ray. “In the future, screens will feature color, and designs will be rendered in computer-generated animation. Also, there are even prototype systems now under development that can automatically engineer a building without human assistance once the requirements are entered.”

Ray believes that as hard copy disappears and information is increasingly shared through computers, “all parties will have to interface more.” But will this bring about changes in the relationship between design professionals and contractors?

“I don’t think so,” said Ray, who holds the view—shared by many—that computers are “simply a tool, just like trucks or cranes, that only help you do your own job better.”

However, Arthur Andersen’s Smith speculates that as computers help designers get easy entry into questions of constructability, “they could start moving more into project manager roles”—and thus accelerate the current growth of alternatives to the traditional single contract method of construction, such as construction management (CM) and design/build arrangements.

Asked whether increased cooperation between designers and contractors would blur traditional lines of professional responsibility, Smith was uncertain—but did cite the example of Britain—where subcontractors can be selected by the architect, and are accorded special privileges over other subcontractors in recognition of their design work.

Bidding and Paying

The IBM Construction Executives Conference was also addressed by a general contractor, William Robinson of the Mellon-Stuart Co.—a Pittsburgh-based firm which recently built that city’s landmark PPG Plaza building—on the company’s experience with computerized estimating.

“Computers let general contractors get a sense of line-item prices,” said Robinson, who explained that, “our branch offices are able to share pricing data with the main office. And we subscribe to reporting services which give us labor and material prices updated daily via computer. So we are less susceptible to inflated subcontractor bids.”

Some at the conference worried such information could afford general con-
tractors new leverage in “negotiating” subcontract prices, or could provide justification for increased bid shopping. However, Robinson believes, “when we have a good handle on prices, we are more likely to go with a new or less experienced sub, because we know he’s not underbid and can do the job at his price.”

Others suggested any advantage the general contractor might realize over his subcontractors would be canceled out as the owner and his representatives presumably gain access to the same labor and material pricing information.

“Practices such as front-end loading by the general contractor could become more difficult,” said one observer, as computers would afford owners a better grasp of true prices. “And for that matter, it might be harder for GCs to delay subcontractor payments when scheduling and percentage-of-completion data is available for all to see at the touch of a button.”

Mellon-Stuart’s Robinson agreed that “with CAD, contractors will have to interface more with architects and engineers.” But on the question of increased data sharing with subcontractor, he was more circumspect, saying only “there will always be an arm’s length between GCs and subs.”

Robinson’s comment gets to the heart of the issue: For computers to be fully effective in construction, data must be shared across all the parties involved in the building process. Yet in such an environment, are traditional arm’s-length arrangements adequate? Can a general contractor, to name just one example, share full project scheduling data with subcontractors knowing this may reveal when he receives funds from the owner and shows when other trades are being paid?

Clearly, computers will be a great boost to construction contractors—though in many respects, only to the extent they are willing to accept closer relationships with other parties and to share data over which they have control. But given the traditional-bound nature of the construction industry, computer technology is likely to advance faster than the industry can accept new business relationships suited to that technology.