

# A NEW SPIN ON BID SETS

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*Electronic bids sets can save time, money, errors and headaches. Learning to create and use them may take some effort, but the payoffs justify the investment.*

Imagine someone who takes four hours to ride his bike back and forth to work every day but, when asked why he doesn't just learn to drive a car, answers that he doesn't have time to do so. That would take an additional two hours every day for a week, he explains. He would miss the evening news every day.

This kind of thinking reflects a common attitude found among workers. Employees are generally very busy, and don't feel they have time to take a few days to learn how to use new computer technology. But a company's ability to fight this attitude is usually reflected in its success. Leading companies realize the importance of taking time off from the normal income-generating work flow to think about the future.

That's what makes the U.S. Army Corps of Engineers' electronic bid set (EBS) process so appealing. By putting construction documents on CD and then using various software programs to view them, one can simplify the bid process, save time and money, and offer a greater number of participants access to the process. One just needs to take the time to learn how to use the system.

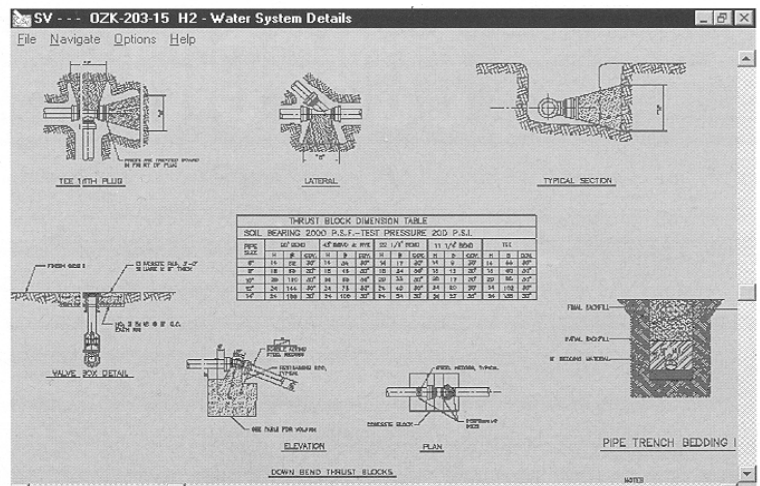
The EBS system, which currently involves putting drawings and documents on CD, saves time, money and effort. For example, the Corps typically prints and mails at least

100 sets of construction documents to bidders for every project. Paper reproduction can easily cost \$40,000 or \$50,000 on large projects. Putting documents on CDs and producing 100 copies cost only \$1,200, regardless of the size of the project.

A CD-ROM provides approximately 640,000 kbyte of storage space. The average D-size drawing sheet requires about 150 kbyte, and specifications require around 5 kbyte per

sheet. The storage requirements can go up significantly if photography is used with drawings or specifications, or if a significant number of the specification pages have to be scanned. Still, these increases haven't caused a problem to date.

Just as important, it's becoming easier for engineers to put their documents on CD. Large CD printing shops have a fixed cost of about \$900 to make a glass master CD, which



ELECTRONIC BID SETS CAN SHOW USERS DIMENSIONS AND BLUEPRINTS ON THE SAME SCREEN.

makes producing small quantities from these sources uneconomical. But some Corps offices are now purchasing CD reproduction machines as their prices fall. Engineers can purchase blank CDs from the larger reproduction shops for less than \$2.50 each and reproduce smaller EBS quantities in-house for \$8 to \$10.

The EBS project has been criticized for not really saving reproduction costs but rather shifting them to private-sector contractors, who will want to print out the documents if they're interested in bidding on a project. However, for every 100 sets the Corps sends out, only about 15 contractors are interested enough to want to make printouts, so the private sector will still spend less than the Corps did to print out documents. The EBS also saves time and increases quality for contractors who normally use sepias to make paper copies for their subcontractors, because they can now make copies of the CD instead.

### **USER-FRIENDLY**

EBS makes construction data more accessible in other ways that might not be readily apparent. For instance, one can put CAD and word processing files on CDs and distribute them to other users, who can then view them regardless of the type of CAD or word processing software they have on their computers.

Typically a user must purchase a specific software application to view a document created in that format. Applications costs can add up to thousands of dollars. Even if the user could get the application free, full-blown applications can confuse a new user because they present numerous commands that are not necessary to view the data. For example, drawing applications that use three dimensional capabilities can mislead inexperienced users, who might inadvertently measure slope distances instead of the intended horizontal projections, as they would on paper.

Using a full-blown application also requires the user to load the application on his or her computer, another process that many people aren't yet comfortable with. These problems restrict access and can render distribution of electronic data useless.

EBS solves these problems because it stores limited software programs, called viewers, on the CDs along with the documents. To create an EBS, an engineer must purchase certain applications; the Corps chose Acrobat and SourceView, both of which provide the royalty-free viewers that are distributed with the EBS CD.

Acrobat allows engineers to put their specifications into a PDF format, which is a popular way of storing electronic documents for the Web. This application shows up on the computer screen as a printer icon. If the specifications were contained in one file, users would hit "print" and then choose this printer icon instead of a paper printer. The result is a file in a PDF format that the royalty-free viewer can read.

Documents that aren't in an electronic format but are required in the specifications can be scanned directly into the PDF format using the Acrobat application as well. The program also allows the user to create internal hyperlinks that take the reader from one location to another by simply clicking on a reference, similar to clicking on a Web page hyperlink. The viewer provided on the CD can also perform internal word searches.

The SourceView application allows users to view construction drawings, and works much like the Acrobat product. The file format that SourceView uses is Type I CALS (continuous acquisition and life-cycle support) Group 4. Currently most engineers use Iplot or Aplot applications from Intergraph Corp., Huntsville, Ala., to produce the CALS files. These applications produce CALS files faster than any other methods, although this may change as manufacturers upgrade their software. For example, AutoDesk, San Rafael, Calif., provides free CALS drivers with its AutoCAD version 14. The creation of the CALS files is once again simply a matter of "printing" (also called plotting) to a paperless printer.

A number of other files go on the CD with the specifications and drawings, most of which are required by the viewer and don't change from job to job. One file that does need to be changed is the CON file. This is an ASCII file used by the contract viewer, a free program developed by the Corps. Project names, due dates, amendments and other job-specific data are kept in this file and must be updated with each job. When everything is saved to (or technically burned onto a CD) any user can view it. The contract viewer will load automatically from the CD.

Electronic storage can save time as well as space. Published statistics state that 15% to 20% of our time is spent looking for information. This inefficiency can be hard to visualize because it is hidden in a lot of small searches performed everyday, as well as in larger searches that take place only occasionally. With construction documents now in a more accessible, electronic format, searches go much faster, and there's far less chance of any data getting misplaced. In addition with Web server technology, an electronic search can be extended to look within documents that are stored on a server.

### **KEEP IT SIMPLE**

An electronic document management system can be scary a thought. You can spend a lot of time and money converting from paper storage to electronic storage. To minimize distractions, it's best to first think about your current paper system. It's usually made up of rooms, filing cabinets, drawers, folders and individual documents

inside folders. You can duplicate your paper world on a hard drive using file manager software. For example, if you store all your files in a particular room, create a directory with the same name or number as that room. If you paper folders are labels with client names, then create subdirectories using client names. Do the same with other information, such as job numbers or regional information. If security is a concern, most operating systems offer the option of password protection.

Storing files in this manner is also the foundation for moving to a Web-based system. Web technology will allow directories and files to be published directly to the Web with little more effort than setting up a Web server. Once your files are on the Web, your information searches can be extended into the data inside the files, not just file names. For example, you could find all Tennessee jobs because the search command will see the word "Tennessee" in your specifications. This takes some extra set-up time, but it offers tremendous advantages.

At the Memphis District of the Army Corps of Engineers, we chose to store all our data live, meaning on hard drives. A 4 Gbyte hard drive can hold up to 20,000 D-Size drawings and their specifications. At a cost of \$600, this is the equivalent to about 6 sq ft of office space. We chose the hard drive because the electronic industry hasn't yet proven that CDs will last longer than ten years, although there are plenty of short term benefits to storing drawings and specs this way. Keeping live data also means that when we update our hardware, the storage media will be refreshed, which is essential to the longevity of electronic data. As always, we will make regular backups and keep annual backups indefinitely.

The legal issue of using CDs for publishing construction documents is also a concern, but in my opinion, it's simply a fear of the unknown. The most common issue involves the ability of others to change a document once it's published. In fact, anyone can alter a paper drawing after it has been signed, but it would take a well above average computer user to figure out how to change something on a CD-ROM, if it's possible at all.

## **FUTURE FILE**

Electronic bid sets are in their infancy, and many more improvements lie in the near future. Currently the software deals with electronic drawings as individual sheets, and users manually put them together to create a document. As engineers, we can and should encourage software developers to understand more about the information contained within our documents. Indexes, page numbers, section symbols and title block information make up the fiber that holds our drawing together. When we plot our drawings, we shouldn't have to tell a computer how to order them. The computer should recognize our industry-standard ways of ordering drawings and order them for us.

Plotting should also create a completely hyperlinked set of drawings ready to be burned onto a CD or published to the Web. This too shouldn't require any additional work from a user. If done right, this should reduce drawing production time and effect some quality control in the process.

Symbols are usually included in CAD drawings using cells or blocks. We could reduce by half the number of steps it takes to place these symbols in our CAD files if we had commands to perform these tasks. Software could tag the symbols as section call-outs. The tags could then hyperlink a set of drawings in the plotting process. If a call-out or section is accidentally deleted or incorrectly keyed, we would find the error during the plotting stage, providing hands-off quality assurance.

Software could also apply the same methods to indexes and other "manual" hyperlinks that are found in our specifications and drawings. And last of all, our title blocks generally contain all the information required to put all our drawings in the correct electronic drawer. The software could look at the drawing title block as a database entry form, full of information that could be useful in storing and searching for drawings.

As the vice-chair of Intergraph's plotting special interest group and a new member of the Corps's EBS committee, I have seen some willingness on the part of certain developers to consider the changes above. As always, however, developers won't implement new ideas unless they see large-scale interest. Engineers who want to see these changes should contact software developers.

EBS will have a major impact on the way we do business in the future and will aid engineers and public officials in their effort to protect the public's health, welfare and safety.

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