



by  
**Stephen G. Revay**

In the winter 1985 issue of the Revay Report (Vol.4 - No.1), Brent Holden made the following statement:

*"The computerization of job and contract oriented industries is accelerating rapidly. In 1974, 74% of Canadian contractors surveyed "would never consider using a computer for cost control". By 1980, only 11% "considered computerized cost control unimportant". Similarly, interest in computerization for estimating rose by 60%. There is now a universal awareness among contractors that computers are indispensable to their operations. Armed with the right information at the right time, they plan more effectively, make better decisions and respond to unexpected problems rapidly.*

*Now a breakthrough in the availability of industry specific software is underway. Certainly, general accounting and payroll packages will continue to serve their purpose, but what is truly exciting is the application of the computer to the operations side of construction. The new software supports key functions such as estimating, budgeting, planning, scheduling, progress and cost control. Where once the computer was limited to after-the-fact functions such as cost distribution or general ledger, now before-the-fact information can be produced to solve immediately management problems such as determining final cost, pinpointing completion dates and comparing the fastest and/or cheapest plans of action."*

*The period between 1974 and 1985 has generated tremendous advances in the use of computers, as can be seen from Brent's comments. Perhaps, even more important is that desk-top computers (PC) gained general acceptance during this time, which probably revolutionized the use of computers in all walks of life. Since 1985 the use of computers exploded exponentially to the point where their use in information processing is generally unquestioned.*

*However, litigation support may be an area where the overreliance on the use of computers often*

*results in costs exceeding the benefits. This is certainly true in some instances, but hopefully the use of computers in the future will be limited if the cost-benefit ratio is kept in mind. In any case, one must question the reasons for spending \$ 2-3 million simply to create a computerized document management control system regardless of its usefulness during the hearing. There is something wrong with our legal system if we cannot come to grips with the issues without filing several million sheets of papers and then try and question witnesses on their contents. Speaking on construction disputes only, I am convinced that not more than 10 percent of the documents generated during a construction project will have any impact on the outcome. The difficulty is of course not only to identify that ten percent, but also to have the other side agree to it. Perhaps the exorbitant cost of computerized document control will accomplish what litigation lawyers have failed to achieve in the past, namely to restrict the volume of discovery to really relevant documents. After all, other legal systems have found a solution to this problem. In this issue of the Revay Report, you will read about three different systems of document controls and the comparison presented therein may, hopefully, help you decide on which direction you would like to proceed.*

## Construction Documentation Using Digital Images

by Gerald McEniry

As the old adage goes, a photograph is worth a thousand words, hence one of the most effective ways of recording and communicating site conditions, problems and progress is by visualizing them. These images can provide an indisputable and indispensable record for claims preparation and defence.

At the present time, these images are captured either on film or video. However, as a result of the delay between taking and developing the photograph, these images provide little benefit in communicating current problems. Storage and retrieval is also a problem. Often they are simply put in an album, stored on a video cassette, and then put on a shelf and forgotten until some future need arises. Access to this information is limited to those close by. Retrieval of information is slow and time consuming since few people keep a detailed index of the photographs.

With the recent increasing popularity of digital cameras and portable computers, all of the above problems are solved. Field staff on distant projects can now take digital photographs of project progress, problems (site conditions, utility conflicts, changed condi-

tions, etc.) and then instantaneously transmit the annotated photographs to the home office, owner representatives, professionals, etc. either by modem or the Internet. The images can also be electronically linked and transmitted with detailed daily reports for further documentation.

This represents a tremendous increase in the utility of digital images over photographs as a communication tool. In no time at all, the project participants can view the site conditions without leaving their offices. Problems can be understood and resolved much more quickly since each party can review the information and provide rapid feedback to the project manager, contractor or owner as required. By using the flexibility of other computer presentation software, the photographs can be immediately pasted at any time to site instructions, change orders, letters, daily or weekly reports via current word processing programs for hard copy printing or imported into any slide show for presentation purposes.

Another important advantage is that the digital image is stored in an electronic database

and can be coded with key words, work package numbers, activity ID's, or virtually any type of identifier to allow rapid retrieval possibilities, otherwise impossible with ordinary photographs. These images can be accessed by date, keyword, job number, subcontract, etc..

Using an activity identification number allows the photographs to be linked to popular scheduling software such as Primavera or Microsoft Project, adding an additional visual dimension to the schedule, and providing numerous "snapshots" of progress on any activity.

The photographs can be archived to provide thousands of visual "as-builts" that would be ideal for facility managers, and design professionals. Since each photograph allows for digital compression, as many as 30,000 photographs can be stored on a 1 gigabyte hard drive at an average price of a little over a penny a piece.

Digital imaging software can provide a complete and accurate record of progress and problems that can be essential in negotiating and resolving claims between various con-

tracting parties. Once down loaded from the camera, the secured photographs are essentially "tamper proof" as the result of integrated security procedures in the software. Date and time are automatically stamped onto the photograph. Permanent captions and other explicative notations can also be attached to each image. The images and their respective daily reports can then be presented as evidence before the courts, but better still used in negotiations to avoid litigation.

Digital image software will revolutionize how construction is managed and documented. Digital images will permit owners, contractors, and professionals to stay in touch with their projects not only locally but especially internationally. Electronic storage and retrieval will simplify archiving of photographs. The potential savings in time and

money are enormous. The cost of the system can be recovered by saving field trips, courier expenses or through minimizing construction claims. In fact, as a documentation tool, minimizing and resolving construction claims may prove to be the most valuable asset of such a system.

At the present time, we know of only one software package that can do all the above with digital images. The trademark LYNX software was developed by TRF Systems in Florida.

In the United States, the LYNX system is currently in use by many public and private owners, property developers, large general contractors and increasingly by design firms. The system is also becoming very popular with many American firms working internationally.

In Canada, one of our clients is presently installing the LYNX system to manage the construction of the new Canadian Embassy in Algeria. Communication channels have been set up with the site in Algiers, the contractor's head office in Montreal and the owner in the Department of Foreign Affairs in Ottawa. While viewing the images and reports transmitted via CompuServe or the Internet, all parties will be able to discuss the problems and progress on site almost instantaneously, as well as archive the information for future use.

As an authorized distributor of the LYNX system, Revay and Associates are introducing this technology into the Canadian construction industry. For more information please contact the nearest Revay and Associates office.

## Document Control in the Construction Industry

by *Beatrijs Williams*

Every construction project has the potential of resulting in a dispute, regardless of the best intentions displayed by all parties involved. This is a reality that has to be dealt with and cannot be ignored. Proper documentation can possibly avert or altogether avoid such a situation. However, ultimately it will provide the proof required to either substantiate or defuse a dispute.

There are two ways to handle documentation on a construction project:

- Post-Mortem Document Control - by reviewing, sorting and categorizing all documents after the project is complete.
- Ongoing Document Control - by managing the paperwork on a project while it is ongoing.

On the face of it, deciding which route to follow, would appear to boil down to taking the gamble. However, it is important to realize that Ongoing Document Control can have a positive impact on a project and, as such, might assist in alleviating and solving situations that under other circumstances would have turned into a dispute.

In this age of computer technology, the tools for document control are within easy reach. Although many in the construction industry still appear to be using the traditional paperwork, only slight changes would be required to computerize these systems.

Currently in the construction industry, computers are most often used for word processing and accounting; yet, the individuals who have the skills to use the computer for these purposes, also have the skills to go one step further into the realm of Document Control by using database packages.

### Post-Mortem Document Control

This type of document control comes into play if a dispute has arisen. It is the system by which those involved in the project, as well as legal counsels and experts get a handle on the numerous files, binders and boxes of paperwork that have been generated during the project.

There are most often two purposes for engaging in this exercise:

- The first is to review all documents and create a catalogue referred to as an Affidavit of Documents. All documents pertaining to the project, whether relevant to the dispute in question or not, are to be entered into this catalogue for the purposes of "discovery". The particulars are very straightforward such as date, author, recipient and an abbreviated subject matter.
- The second purpose is to familiarize the other parties involved, such as legal counsel and experts with the documents that are relevant to the dispute(s) at hand. This requires a more detailed examination of the documents and is often referred to as the Relevant Information Database.

The most powerful document control software for the Post-Mortem document control comes in the form of database packages. With their almost infinite searching capabilities, they are by far the most effective tool in gaining control of the overflow of information that often occurs on a construction project.

The process in inputting the data into a database can be done in two distinct manners:

- The first entails having someone with construction knowledge review the documents, determine their relevance to the dispute(s) and then proceed with the inputting into a database created specifically for this purpose. It is important to note that the individual reading the documents requires construction knowledge, as well as an understanding of the relevant issues so as to ensure that the document selection process is comprehensible. In most databases created for these purposes, an elaborate coding system relating to the dispute(s) is created to enable extensive and meaningful searches to be done at various times during the dispute resolution process.
- The second process is one by which the entire document is scanned into the com-

puter system and subsequently, searches are undertaken to find all documents relating to a specific issue. The latter of the two is a more costly method than the former and is limited by the effectiveness of the scanner to discern handwritten text, of which there is an inordinate amount in the construction industry.

There are two keys to creating an efficient database, as follows:

- Creating a database structure (fields) that reflects the project;
- Creating a coding system which encompasses all the various disputes and that will ensure the searching and sorting requirements that will subsequently be necessary.

### Ongoing Document Control

Often, the most costly component in dispute resolution, regardless of its magnitude, is the time required to sort, classify and compile the information available, in other words to create the Post-Mortem database. Therefore, reducing the cost of dispute resolution would involve setting up a Document Control System during the life of the project, or what is known as Ongoing Document Control.

Clearly, one benefit of Ongoing Document Control would be, as outlined above, the insurance that it provides in case of a dispute. One would think that this would suffice, in the current economic climate, to entice those involved in the construction industry to set up such a system.

Yet, from our experience, this reason alone is not compelling enough. It is imperative to realize that the documents that are required in dispute resolution are the exact same documents that are required for the daily management of a construction project - no more, no less. Therefore, if the threat of potential disputes seems negligible, it might be worth considering the impact that Ongoing Document Control might have on the daily management of a construction project.

The above statements would imply that if such a system is not in place, then the daily

project management could be severely hindered. In the purely theoretical sense, this is correct. However, it is important to remember that it is the role played (owner, contractor, subcontractor, etc.) and the size of the project that will determine the complexity of the Document Control System required.

Below, we offer some simple measures that can be taken to implement a simple Document Control system.

It would be safe to say that the two types of software most often used in the construction industry are word processing and spreadsheet packages. Both of these types provide the user with document control capabilities built into the programs which could be implemented as the documents are created throughout the project.

The equivalent of a file card is attached to each document, recording the "vital statistics" of the file in question. They also give the user the opportunity to list, as an example, key words that could be used for the requisite searches at a later date. Also, these packages provide the feature known as "indexing" which is the identical terminology that is used in the database packages. Indexing files consists of organizing the files in a specific order that is beneficial to the user. In some cases this is referred to as Indexing, in others as Searching. In the leading packages, this temporary organization of files can be stored into a permanent grouping, allowing the user to retrieve these organized listings when needed.

The suggested document control process just described deals only with the documents created "in-house" as these are stored on site. There remains the documents that are received from the other parties involved in the project and these should be recorded in either a database or spreadsheet system.

Until now, the advent of E-Mail and the Internet have not been accepted in the construction industry with the same fervour as other industries. These methods of communication have revolutionized the way by which data is transferred between parties, ensuring that at some time in the future, mail couriers and faxes will become obsolete. Imagine the efficiency of being able to push one button and ensuring that the several parties that are to receive a copy of the document in question will have it at their disposal in a matter of seconds. In the construction industry, where, more often than not, time is of the essence, this can be and already is in a few cases, an extremely powerful tool. It would not be unreasonable to say that at some point in the not too distant future, this method of communication will be entrenched in the contractual requirements of a project.

Once these new methods of communication become inherent to project management, the documents received will be classified along the same lines as in-house documents. In the interim, the documents received from the other parties will have to be "manually" entered into the system in use and properly filed.

# Application of Computer Databases in Construction Litigation

by Trevor Minstrell

## 1. DATA STORAGE

The use of computer databases for recording and searching large volumes of documentation has increased recently in both the number and scope of the applications. The state-of-the-art database generally has two components, one a text-based index and summary of the documents and the second, a graphical image of the document. The first is necessary for the organization, searching and retrieval process while the second provides a graphical image of each document. The latter is optional but desirable, particularly if there are a large number of documents with numerous people at various locations requiring simultaneous access.

The text database has been described in the previous article. This article, on the other hand, deals with document management on large and complex projects.

The software used for data storage and retrieval may be a conventional commercial database package for smaller applications, or a more specialized documentation package for larger projects. In cases where there are large numbers of documents, the data images and (if large enough) the text database would be recorded on a series of compact discs (CD's). Optical recognition software (OCR) can translate the image of a document into text which can be handled by word processor and searched in a database.

The present generation of OCR software is not yet sufficiently advanced so as to allow the direct reading of the images to create the full text without a significant amount of subsequent verification and correction. As a result, the above process is labour-intensive and requires that knowledgeable staff review each document to assess the level of detail at which it would be entered into the database, both the textual attributes and whether the full document should be recorded as a graphic image.

## 2. USE OF THE DATABASE

### 2.1 Use for Case Preparation

The Affidavit of Documents, as the collection of documents on which a case will be based, must be the minimum criterion for establishing the computer database. Documents from the opposite side, discovery and trial transcripts may also be added to the database when they become available. Economics may dictate that the opposition database be prepared separately if the document indexes are large enough to be produced on CD's.

Information can be added to the document records in the database to identify a document as relevant to particular issues and/or subjects. Documents which refer to such issues as delay, productivity, acceleration, scope changes, etc. can be flagged, usually with one flag per topic so that one document could be flagged more than once if it pertained to a number of issues. Similarly, the documents of any particular type or which

were originated or received by a potential witness could also be identified.

The transfer of documents from one side in the litigation process to the other is made simpler and less prone to error with a comprehensive document database, even if the database does not have the associated recorded graphical images.

### 2.2 Courtroom Use

The effective use of computer-based documentation in the courtroom requires the cooperation of the judge, the witness and both sides in the litigation. With acceptance by all parties, there would not be a need for the multiple copies of the Affidavit of Documents usually provided in the courtroom, except for copies of larger documents which cannot be seen effectively on the screen. In larger cases the Affidavit of Documents amounts to 100 volumes or more, and six copies of each could be required in the courtroom.

In a typical courtroom application, each party is provided with a large-size computer monitor fed from a central computer. This central computer is operated by a mutually agreed or court-appointed independent technician. The technician calls up the document as it is addressed by the examining counsel with each witness. In this manner, all letter or legal-sized documents is viewed simultaneously by each party.

The software should provide for each participant to be in "public" or "private" viewing mode. In the former, the screen would show the document currently selected by the technician, while the "private" mode allows the judge or other party to review another relevant document without having to have the document retrieved for general viewing with the consequential interruption of the flow of the examination.

The process of retrieval and distribution of documents in the courtroom is speeded up by using electronic images which can be retrieved quickly without any movement of staff around the courtroom.

## 3. DISCUSSION

### 3.1 Accessibility of Documents

The accessibility of documents is made much easier by a well-prepared database, particularly if it contains at least a synopsis of the contents of each document. It is not necessary to read every complete document that is found which fits the search criteria. It is possible from a review of only the summary text to identify those with little or no relation to the matter in hand, or others that may contain only information which confirms that already gleaned from other sources. Storage of the full text in the text database gives search capability which is only limited by the software's search power.

Printing of copies of documents from the graphic image can be quicker than locating

the original document and making a photocopy, and copies can be printed from all or some of the documents found in a search.

### 3.2 Cost/Benefit

The selection of the appropriate software for document management is most important to the success of the implementation of this technology. However, the initial cost of the software becomes a minor part of the overall cost of the use of computerized databases. The input of the documentation into the database represents a significant frontend expenditure. The precise justification of this cost is not easy to quantify as the benefits may be largely intangible such as improvements in

identification of all documents against issues or response time to questions raised in discovery or at trial. It is considered unlikely that one could identify a noticeable reduction in billable hours.

A subjective evaluation of the use of computer databases generally yields positive responses from the legal teams and their supporting consultants, citing ready availability of all data at all times without the necessity of copying, cataloguing storage and retrieval of the voluminous documentation by each participant.

There is some understandable reluctance to place one hundred percent reliance on a

computer system and the searches of it. A search is only as good as the match which the computer can make with the text sorted in the database. A typographical error in the original, or an error in the transcription of the document into the text database could result in a relevant document being excluded from a search. This must be considered by those defining the search criteria and there must be constant vigilance by those using the database to identify errors in the data.

There can be no doubt that the use of computers is becoming pervasive (some might say intrusive) in today's society. This is just one more step that appears to be inevitable.

## WHAT'S HAPPENING AT RAL?

### Montreal:

On May 15, 1996, Executive Vice President Regula Brunies and Ottawa Bureau Chief Don Chutter, along with Moncton legal counsel, Guy Martin, presented a case study claims workshop in Moncton, in collaboration with the Moncton Construction Association. The 45 participants rendered arbitration decisions based on written documentation and testimony presented by the two parties.

Michael J. Primiani gave a seminar on "The Integration of Value Management and Risk Management" on May 14 to a joint meeting of the Project Management Institute - Montreal Chapter and the Canadian Society for Value Analysis. Some 60-70 people attended this seminar.

### Toronto:

RAL Toronto presented a seminar on How to Achieve a Profitable Project to 25 contractors at the Toronto Construction Association facilities. The seminar topics included: Poor Project Planning, Relief from Delays and Acceleration, Working with Poor Plans and Specs, Change Orders, Documentation, Litigation and Alternatives.

The Toronto office has been awarded a contract to provide scheduling services and claims assistance for the construction of the new runway, satellite deicing facility, and low visibility aids at Lester B. Pearson International Airport in Toronto.

### Ottawa:

Ernie Johns recently completed a 12-week course sponsored by the Ottawa Chapter of the Arbitration and Mediation Institute of Ontario.

Don Chutter was a guest speaker at the General Contractors Association of Ottawa on June 6, 1996. His topic was "Construction Claims".

The Board of Directors of the Ottawa Construction Association awarded Don Chutter with a Life Membership in the association in recognition of his numerous contributions and many years of service to the OCA and the industry.

### Calgary:

Stephen O. Revay will be on a panel discussion at the AACE conference discussing "Recent Developments in Construction Claims."

Peter Maidment presented a paper "Getting Project Cost Certainty" at the May 1996 PMI Canada Symposium.

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