Introduction

Traditionally trucking companies have stored their paperwork in rows upon rows of filing cabinets. Not only do the filing cabinets occupy a lot of space, several employees are required to file and retrieve the documents. This makes for a slow, expensive and error prone way to store important documents.

With the constantly decreasing cost of computer hardware, electronic document imaging systems are becoming the solution of choice for storing, retrieving and managing documents. Document imaging systems store these documents electronically on computer hard discs for short term storage and CD or DVD for longer term storage. The contents of an entire filing cabinet can be stored on a single CD-ROM. This eliminates the need for row after row of filing cabinets and for the employees who file and retrieve the paper documents. Because of the large volume of paper that needs to be tracked, trucking companies in particular can take advantage of this technology to reduce costs and improve efficiency.

Virtually every department in a trucking company can benefit from document imaging. Besides the obvious candidates, like bills of lading and delivery receipts, things like trip sheets, driver logs, checks and vehicle maintenance records can be stored electronically. The uses for a document imaging system are limited only by your imagination.

Document imaging systems do more that just store and retrieve documents. For example, TransDoc allows you to:

- Fax documents
- Email documents
- Merge documents with invoices (rendition billing)
- Merge your invoice form with the invoice data eliminating the need for pre-printed forms
- Provide a web interface so your customers can retrieve their own documents
- Export documents to hard disc, CD or DVD
- Import documents from hard disc, CD or DVD
- Automatically index documents by reading bar codes and using that information to retrieve further indexing data from your database
- Mark up (annotate) documents
- View data from your application, for example bills, together with the corresponding images

Document imaging systems can be hosted on your own servers. In this case you, or your IT staff are responsible for the day-to-day running and maintenance of the system. This means that you must back up the imaging database regularly, copy older images to archival storage periodically and monitor the server's disc capacity to make sure that you don't run out of space. This list goes on and on. As an alternative, document imaging systems can be hosted by a service provider on their servers. They provide access to you via a broadband Internet connection. In this case, the service provider is responsible for all system maintenance. This can be a very good choice for companies that do not have a dedicated IT staff.

How Do Imaging Systems Work?

Document imaging systems are a means of storing reams of paperwork. A person scans the documents and indexes them so that they can be retrieved when needed.

There are many ways of capturing the documents. They can be scanned using a scanner that is directly

attached to a PC. This scanning station can be attached to the server via the local network or via the Internet. Documents can be faxed to the server either via dedicated fax lines or via an Internet fax service like MyFax. Documents can be imported from digital cameras or from files on hard disc, CD or DVD. The method(s) that you use will depend entirely on your requirements.

Once a document is captured it is indexed. That is, it is marked with information that identifies the image in some way that allows it to be retrieved later. Index information might include the pro number, the image type (bill of lading, delivery receipt, etc.) and ship date, among other things. The information that you use to index an image is really dependent on your requirements. A lot of human effort can be saved if the document has a bar code containing the primary piece of index information, like the pro number. In this case, the document imaging system can automatically index the document as it is scanned, without human intervention.

In order to ensure fast and easy retrieval of the documents that you are most likely to need, recent documents are stored on the computer's hard disc. As documents age and become less likely to be needed they are moved to archival storage. This can be CD, DVD or network attached storage. Each has its advantages. CD and DVD are permanent but are slower. Network attached storage is almost as fast as the local hard disc but it is not permanent so it needs to be backed up regularly. This makes it more challenging to manage.

Storing all of these documents is not much use if you can't get them back out of the system again. There are many ways that this can be accomplished. You can use the imaging system itself. In this case you would have to enter the required index information into the imaging system's search form. Since you have probably already had to look up information from another computer application this means re-entering the search criteria into the imaging system. Alternatively, your other computer applications can be integrated with the imaging system. In this case, you enter the search criteria into your back office application and it "talks" to the imaging system telling it to retrieve and display the required images. Obviously, this would be the preferred way since it saves you time and effort. TransDoc allows to you use either of these methods according to your requirements.

In some circumstances, it is necessary to merge printed copies of the images with invoices or other computer generated documents. For example, it may be necessary to send a copy of the signed delivery receipt with the freight bill. Document imaging systems facilitate this through a process known as rendition printing. Rendition billing prints the required document (freight bill) followed by the required images (delivery receipt). All that remains is for a clerk to separate the individual freight bills and mail them to the customer. Even this final step can be eliminated if you choose to email or fax the freight bills directly to the customer.

Benefits of Imaging Systems

There are many benefits that can be derived from document imaging systems:

- Less floor space is required for document storage. This results in reduced real estate costs.
- Fewer staff are required to file documents. If bar codes are used documents can be filed without any human intervention, other than that required to feed the scanner.
- Fewer staff are required to retrieve and re-file documents. Since everyone can get the documents that they need right from their desk you will no longer need people to pull and re-file documents.
- Improved customer service. Since your customer service people have immediate access to documents, customer inquiries can be answered while the customer is on the phone. It is no

longer necessary for customer service to leave their desks and walk to the filing cabinet to get documents. Further, if you choose to implement a web interface, your customers can retrieve copies of their own documents without having to call your customer service department at all.

- Fewer staff are required to assemble and mail invoices. Through the use of rendition billing it is no longer necessary to have staff pull and photocopy documents that need to be included with the invoices. The invoices and necessary documents can be printed together. If you choose to fax or email invoices to your customers it is no longer necessary to have staff separate the invoices, stuff the envelopes and mail them. This reduces staff, photocopying and postage costs.

- Improved filing accuracy. Since the indexing information, like the pro number and customer id, can be verified at the time the image is filed, misfiling of documents is greatly reduced. Further, since the documents are no longer being removed from the filing cabinet and refiled, refiling errors are eliminated.

- Improved quality control. Since it is possible to cross reference bills with their documents it is possible to produce reports showing bills with missing documents or documents with missing bills. Thus, revenue lost through unbilled loads and missing paperwork is reduced.

- Improved cash flow. Document imaging systems can reduce the time between providing a service and receiving payment. Since documents can be filed and retrieved faster it is possible to produce the bills sooner. Also, since documents can be faxed directly into the imaging system, it is possible for cross country drivers to fax in their delivery receipts, potentially reducing the billing cycle by several days.

System Requirements

Like any other applications, document imaging systems require computer hardware to run. To be able to run an imaging system effectively you are going to want a server to store the images and workstations that will host the imaging application client.

The Server

Typically, the server can be a fairly modest machine in terms of memory and processor power but it will need large amounts of disc storage. A typical black and white image scanned at 200 DPI requires 20K – 40K of disc. A modest sized trucking company can easily need to store 1,000 or more images per day. This would require 20MB – 40MB of disc storage per day, or to put it another way 7.5GB – 15GB of disc to store 1 years worth of images. Obviously, disc requirements can increase dramatically if images are scanned at higher resolutions or are kept on the hard disc, rather than being archived, for long periods of time. The large size of typical imaging databases brings us to the next points, disc redundancy and backup.

Unless you enjoy being down for long periods of time while the system administrator recovers your imaging database from backup media you will want to consider redundancy in your disc storage. There are any number of ways to achieve redundancy but perhaps the best and easiest is to configure your disc as a RAID (redundant array of inexpensive disc) array. The two most common configurations are called RAID-1 and RAID-5.

A RAID-1 array duplicates the contents of each disc volume onto a second volume. This means that you have two complete copies of your data at all times. This allows you to switch to the backup drive if you primary drive fails for any reason. This is usually handled transparently by the operating system

so that your users never now that a disc drive has failed. You can then replace the defective drive at your leisure.

A RAID-5 array uses one extra disc drive to store checksums of the data on the other drives in the array. If any one drive in the array fails the data on that drive can be calculated from the checksums. Much like RAID-1 this allows you to keep running in the event that you lose any one drive and you can replace the failed drive at your leisure.

Typically a RAID-1 array will provide better performance that a RAID-5 array. Since you have two identical copies of that data you can read from either copy, this reducing disc contention. Write operations to a RAID-1 array also tend to be faster that writes to RAID-5 arrays because there is no need to calculate the checksums, which is a very compute intense operation.

So now that you have decided that a RAID array is a really great thing to have, you have to be aware that even the best RAID array can fail in such a way as to totally destroy your data. This means that you still need to backup your data. There are any number of ways to do this, but the most common are; tape, network attached storage and removable disc drives.

Tape is inexpensive and can handle large amounts of data but it is slow and not very reliable. It has the benefit of being the most "traditional" means of backup.

Network attached storage allows you to make a copy of your data to another server on the network. Copying large amounts of data across the network can be somewhat slow and can adversely impact other users on the network.

Removable disc drives, such as USB drives, offer an inexpensive, reliable and relatively fast means of backing up large amounts of data.

Backing up even a modest document imaging database can takes hours. Therefore, part of your backup strategy should include periodically copying images to archival storage. Once images have been archived to a permanent medium like CD or DVD those images no longer need to be included in the daily backup. This significantly reduces the time and amount of storage required to perform your daily backup tasks.

The Workstation

The workstation is the computer that your users will use to interact with the imaging data stored on the server. While the requirements for the workstation are typically quite modest you will want to invest in a good quality graphics card and monitor. In the case of the monitor, bigger is definitely better. The bigger the monitor, the less time your users will have to spend scrolling the images up and down or left and right to be able to see them all.

The Scanner

At least one workstation will need to have a scanner attached. There are a wide range of scanners available able today, from $100 flat bed scanners to multi-thousand dollar, top of the line, super fast scanners. Ultimately, what you get will reflect your own particular needs but a few general recommendations can be made.

Unless you are only scanning a very few pages in a day, don't waste your money on a scanner without and automatic document feeder (ADF). Also, you probably won't want to buy the cheapest scanner that you can find. Typically, cheap scanners have poor quality mechanicals and you will be plagued with misfeeds, poor quality scans and they will wear out faster than a good quality scanner. Another factor

to consider is scanner speed. Scanners are usually rated in pages per minute (PPM). Obviously, the more pages that you scan in a day the higher PPM rating you will want. If you can afford it, buy a higher PPM rating than you think you will need. Like everything else, the PPM rating is given for the "ideal world". The actual performance will probably be somewhat less.

Having said all that, you should be able to get a decent 15 – 25 PPM scanner for less than $1,000.00.

The Printer

If you are thinking of doing rendition billing, you will want to invest in a good quality laser printer. As with scanners, you won't want to buy the cheapest printer that you can find. Better quality, read more expensive, printers not only tend to be faster but also tend to have a higher "duty cycle". The duty cycle is the manufacturers recommendation on how many pages per month the printer can handle without suffering undo wear. The higher the duty cycle numbers the less often you will have to replace the printer. Also, like scanners, buy a higher page per minute rating that you think you will need. The PPM rating will only be achieved when printing plain text documents. Printers can often be significantly slower when printing images.

Faxing

Document imaging systems provide the ability to fax documents to customers without the need to print the document and carry it to the fax machine. In order to be able to do this you will need either a dedicated fax line or an account with an Internet fax provider like MyFax.

If you want to have your own dedicated fax lines then you will need either a fax modem or a specialized fax card, like those supplied by Brooktrout. In our experience, fax modems tend to be unreliable and to have compatibility problems with standard fax machines. Specialized fax cards, however, are very robust and have few reliability and compatibility problems. The cost differential between a specialized fax card and a good quality fax modem is not that great, usually not more that $100.00 or so.

If you don't want the expense and headaches of having your own dedicated fax lines, a contract with an Internet fax provider can be attractive. The cost of these services can vary widely, but they are usually based on a flat fee for a certain number of pages per month with per page surcharge if you go over your contracted page limit. Typically, the more pages you send in a month the lower your per page cost tends to be.