

The InstaBook Maker: book printing eases into the bookstore

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Someday, your local bookstore may be able to print you a copy of any book you want, while you wait. There are significant obstacles to that vision, but one big one—the need for an inexpensive, reliable, and easy-to-use printing and binding system, is being solved. This article describes the first system to make it into the field.

There's a very good chance that, within the next few years, you'll be able to walk into your local bookstore and have a copy of a book printed on the spot. If that comes to pass, it will be because of the work of a few visionary companies that developed the necessary technology. One of those companies, and the first to actually have a machine in a bookstore, is the InstaBook Corporation, the subject of this article.

InstaBook's machine is not just for bookstores. There are a variety of other environments where printing books singly or in very short runs makes sense. Naturally, we will discuss those other markets in this article. But we will always return to the bookstore, because it is, in several ways, the most difficult book-printing challenge of all.

The idea behind printing books on demand, in the bookstore, is as much about business as it is about technology. The book industry has not responded as quickly as other industries to some of the current trends in manufacturing. In particular, publishers tend to spend a disproportionate amount of money on warehousing, distribution, and returns, while bookstores make huge investments in retail space and inventory. Various ideas for improving the current situation have been suggested, and one of the most persistent is the notion of printing books to order, in the bookstore.

The appeal of printing books as they are needed is obvious. At a stroke, all the publisher's warehouse and distribution costs are eliminated. So are practically all returns. The bookstore needs at most one copy in stock (for browsing). The book is never out of stock at the bookstore, and never out of print at the publisher. No money is tied up in inventory, and a significant barrier to the publication of "risky" titles, the cost of the initial press run, is eliminated.

An engineering challenge. With all of these benefits, why hasn't the production of books in the bookstore happened yet? Two reasons. First, the right machine for printing books on demand has not been available. Such a machine needs to be affordable enough, reliable enough, and easy enough to use to fit into a bookstore

environment. It needs to produce books that satisfy the expectations of bookstore customers. And it needs to achieve a low enough cost per book to be able to compete with books produced through the traditional process. Until last year, no such machine had ever made it out of R&D and into a bookstore.

In December of 2001, however, an InstaBook Maker was installed in a bookstore in Canada. That is the event that triggered this story. And an important theme of the story will be a discussion of the design and economics of this machine as an in-store device.

The rest of the infrastructure. But there is another aspect to this story as well, and that is the second reason why in-store printing hasn't happened yet. It has nothing to do with technology. Suppose, in a few years, bookstores have the equipment to print books on the spot. A patron comes into a bookstore looking for a book and finds that it is not in stock on the shelves. The clerk says, "Wait a moment, I'll see if we can print you a copy," and types a query into the store's book-on-demand system.

What are the chances that the book is available for printing? The answer to this question is a key factor in the success of the system as a whole. If only one such request in a hundred can be fulfilled by the system, the clerk will eventually give up trying. No more books will be printed on the system unless the customer knows before arriving in the bookstore that the book is available through that channel. On the other hand, if the book is available through the system more often than not, the system is almost guaranteed to be a success.

Getting to that point will require dealing with scores of publishers and arranging for the conversion of all their files.

The first obstacle has largely been overcome, by the machine discussed here and by competitive devices that will surely follow quickly. But the second obstacle could be a lot tougher.

Solving the second problem isn't essential for InstaBook's success. The early users of its machines are mostly small publishers and book production services, and they don't need access to a comprehensive list of books.

InstaBook can continue making machines for them and for other organizations (such as corporations and government bodies) that need to produce perfect-bound books.

But bookstores are another matter. If the bookstore market is to develop, a huge repository of books will have to be built.

Instabook Corporation

InstaBook Corporation was founded in 1995 by Victor Celorio. Celorio was born and raised in Mexico City. He took an early interest in writing, had a short story published at age 14 and a novel at age 20. He came from a family of inventors.

Celorio became intrigued with the potential of the laser printer as a publishing device. In 1995, he sold the chain of quick-print shops he owned to focus on his ideas about printing books on demand. During 1996 and 1997, he worked with two different prototyping firms, trying to develop a suitable design for an integrated printing and binding system. These efforts failed. In 1998 and 1999, he developed a promising prototype on his own, and he took it to BookExpo '99 in Los Angeles, where it attracted a lot of attention.

One company that saw the prototype was Denlinger's Publishers, in Edgewater, Florida, only a couple of hours drive from Celorio's home in Gainesville. Denlinger's arranged to receive the first InstaBook machine, which was delivered at the end of 1999. Denlinger's has been using it to produce books ever since.

InstaBook Corporation remains a very small company. The home office in Gainesville is in Celorio's home and there is only one other employee at that location. InstaBook employs five programmers in the US and it has seven people involved in assembling the InstaBook machines in Mexico. Most components of the machine are contracted out for manufacturing, and Celorio says that at this point InstaBook is ready to build machines as fast as orders arrive. He will not disclose how many machines are already in the field. When pressed, he would only say that there were "more than ten."

A Canadian distributor, InstaBook Canada, has been set up, and Canada will be the testing ground for the use of the InstaBook Maker in bookstores. One machine was installed last November, and two more are to be installed shortly. Sales in Mexico will begin soon, and a deal is being negotiated with a German distributor. InstaBook plans to add distribution in countries around the world, and letters of interest have already been received from about 40 countries.

Celorio would like very much to place machines in many parts of the world, especially in developing countries, where access to books is limited. He remembers vividly how impressed he was, as a young Mexican coming to the US, with the number and variety of books available in our bookstores and libraries. Celorio would like to help bring that richness of literature and

information to parts of the world that have never experienced it.

The InstaBook Maker II

The InstaBook Maker II, which is the current InstaBook model, is a machine for making paperback books in a 5.5" x 8.5" format. (The same principles could be used to construct a machine that would handle formats up to 8.5" x 11", and InstaBook is prepared to make one, but has not taken an order for one yet.)

To prepare a book for printing, it has to be converted into one of the formats that InstaBook supports (currently MS Word, PDF, or HTML). It must be formatted appropriately for the 5.5 x 8.5-inch page. The software that handles imposition (making sure the right book pages are printed on the right sheets of paper) is provided along with the machine.

A suitable cover file must also be created. An important factor here is figuring out what the spine thickness will be and laying out the cover with this in mind. The choice of software for this task is left to the user.

These file-preparation issues only apply to InstaBook owners that need to prepare books locally for printing. Bookstores that download book files from the InstaBook Digital Bookstore (see below) do not have to deal with file preparation.

How it works. The InstaBook Maker II is a very simple machine. It has three sections. At the left is a laser printer. Currently, InstaBook is using a Kyocera printer, but the company could probably integrate almost any duplex-printing monochrome laser printer that delivers the printed sheets on the top. Printing the book block is usually the slowest step, so it is the speed of the printer that determines the overall throughput of the machine.

In an unmodified printer, the sheets pile up in the delivery tray on top of the machine. But that doesn't happen in the InstaBook Maker. It has a conveyor that picks up each sheet as it emerges from the printer. The sheet is carried between a pair of side guides and through a splitting unit that cuts the sheets in two. The two half-sheets fall into a collection tray in the center of the printer. The tray's V-shaped sloping sides allow the half-sheets to pile up in the order they are printed, one pile on either side of the 'V'. The binding edges of all the half-sheets are together at the bottom of the 'V'.

The slitting mechanism of the InstaBook Maker leaves a rough edge. This helps the glue to grip, making the binding stronger than if the edge were smooth.

While the book block is printing, the operator can print the cover on a separate inkjet printer. The printer is provided as part of the system, but is not built into the system housing. (An integrated cover printer was originally part of the InstaBook concept, but it was dropped when it became clear that the flexibility of a separate, external printer was more valuable than the

convenience of an internal one.) Once printed, the cover is placed in a jig in the right-hand side of the machine. The operator needs to make sure that the cover is properly positioned within the jig's guides and that it is facing the right way. In the case of a run of multiple copies of the same title, covers can be printed ahead of time. The users we spoke with often do this.

Once the entire book has been printed and is sitting in the collection tray (the front half of the book on one side, the back half on the other), the machine stops and the operator can pick up the book block, combining the two halves, and can check it for problems. If any pages are sticking out, they can be jogged into place at this point. This is also the point at which color pages or other separately-printed inserts (a fold-out map, for example) could be added to the book block. Once the operator is satisfied with the book block, it is replaced in the tray (binding edge down), and binding is initiated with the push of a button. There is no further interaction required of the operator until the bound book is ready to be removed and trimmed.

To start the binding process, the book block is grasped by a clamp and held in place. The bottom of the collection tray, on which the pages have been resting, is removed. A shallow pan of hot glue is brought up to the book block from below, until it makes contact, coating the binding edge with glue. Then, the pan is lowered again and the book block (now with its spine coated in glue) is moved to the right-hand section of the machine, where the waiting cover is raised to meet it. (If the operator fails to put a cover in the jig, the machine will glue the book block directly to the jig. This creates a mess that requires a lot of scraping and cleaning to fix.) Finally, the machine folds the cover up around the book block. The operator now removes the bound book and, after a brief period of cooling, trims it.

Trimming is done on a small guillotine cutter (a Triumph Ideal model) that is also provided with the system, though not built into it. Turning the adjustment screw, the operator sets the backstop to the right mark for cutting the front edge of the book. She/he places the book against the backstop, clamps the book in place, closes the clear plastic cover of the cutter, and initiates the cut by simultaneously pressing two buttons on either side of the cutter. The book is then unclamped. The top and bottom edges of the book are trimmed in the same way, completing the book production process.

The full process takes around ten minutes (it varies depending on the number of pages in the book) and the next book can be printing while the trimming of the current one is taking place.

Five markets

Victor Celorio sees five distinct markets for the InstaBook: publishers, colleges and universities, quick printers and copy shops, corporate and government, and bookstores.

Each has somewhat different needs and needs to be approached through a somewhat different channel.

There are several ways publishers could use the machine. A small publisher (or a self-publisher) might do all its book production on the InstaBook Maker, producing individual copies as the orders arrive. (This is the typical situation at Denlinger's Publishers, one of the users we spoke with.) A vanity publisher (i.e., a printer producing books for a fee) could produce a short run whenever an author requested it. (This is the typical situation at River City Press, another InstaBook user we spoke to.) Larger publishers could use the machine for early review copies, or to keep slow-selling backlist titles in print.

Colleges and universities could use the machine to produce course materials in short runs. And university presses frequently have even more need for short runs than other publishers.

There could be a significant new opportunity among the quick printers and copy shops. Self-published authors often start out working with their local copy shop, only to end up with a vanity press because their local shop does not offer perfect binding. A lot more potential self-publishers would get their books produced if it were easy to do locally.

In corporate and government markets, the types of perfect-bound materials are as diverse as the businesses and offices themselves. Manuals and directories of all sorts are among the leading possibilities.

Special needs of bookstores. Finally, there are the bookstores, the market that originally got us interested in the InstaBook Maker. This is a market with very special needs. It is different from the others in several ways:

1. In bookstores, production of one copy at a time is the norm. In other environments, short runs of the same book might be more common.

2. In bookstores, the time required to produce a book, from start to finish, is critical. The customer is standing there, waiting. In other settings, it may be acceptable for an order to be filled in a few hours or a few days.

3. Bookstore personnel are often low-wage, non-technical people. Most bookstores could not afford a dedicated operator, so many different people might run the machine.

4. Finally, and perhaps most significant, bookstores do not control the content they sell. If printing books in the bookstore is to be a success, the bookstore will need access to a digital repository containing virtually any book that a customer might want. This means hundreds of thousands of books (if not millions) from hundreds (if not thousands) of publishers. Furthermore, there would need to be a secure mechanism for getting the content to the bookstore for printing, for keeping track of what has been printed, and for transferring the appropriate sums back to the publisher.

The first three of these factors place important constraints on the design of the machine: it must be

flexible, fast, reliable, and foolproof. The fourth factor goes beyond the machine itself. It requires a comprehensive system for managing digital book files and monitoring book production, on a global basis.

Booksellers, publishers, and the InstaBook Digital Bookstore. We will return to the question of how well the InstaBook Maker deals with the first three factors at the very end of this article. Here, we will discuss the critical fourth factor, and InstaBook's approach to it: the InstaBook Digital Bookstore. The InstaBook Digital Bookstore is the system that links InstaBook Makers in bookstores to a digital repository of books. It also provides a web-based ordering mechanism for customers and a sales-tracking system to calculate publisher payments.

The customer interface to the Digital Bookstore is a web site at www.instabook.net, currently accessible via InstaBook Canada (www.instabook.ca). Here you can find a list of several hundred books that are available immediately, including a mix of small-publisher and public-domain titles, and a much longer list of public-domain titles that can be made available on request. The idea is that a user could order any of these books for printing at a local bookstore with an InstaBook Maker. (In practice, though, the only bookstore that has an InstaBook machine is not yet connected to the Web-based ordering system. So any orders received through this channel are currently produced at InstaBook headquarters, not at a bookstore.)

When you order one of the books in person at a bookstore, the bookstore produces the book and collects payment. At the end of the month, the bookstore keeps 40% of the cover price and sends the remaining 60% to InstaBook. InstaBook, in turn, pays the publisher a percentage (usually 15% of the price) and keeps the balance (25%). The publisher, in turn, pays the author a royalty (commonly 5-10% of the cover price). If the publisher wants a larger percentage than 15%, InstaBook (which controls the pricing) will accommodate this by raising the cover price enough so that it preserves its margins. The bookstore is responsible for the cost of consumables and maintenance, which come to \$1-\$2 for average books. (The higher the page count and the greater the area of color printing on the cover, the higher the production cost of the book.)

No up-front investment. For both the bookstore and the publisher, getting started with InstaBook is a low-risk proposition. The bookstore merely signs up for the program and gets a machine for free. No money changes hands until books are sold. Similarly, the publisher can sign up at no cost. The publisher must provide InstaBook with digital files representing the books that are to be placed in the system. A wide variety of file formats are accepted. A cover file must also be created. InstaBook recommends a simple approach: the front cover can simply be a reduced version (10 cm x 16 cm) of the trade

book cover, on a white background; the spine can just be the title and author in black type, and the back cover can be some kind of blurb, again in black type. Or, the back can be blank—as InstaBook points out, the selling job that a standard book cover must do is not needed for an InstaBook, which is sold before it is produced.

Victor Celorio expects that publishers will not offer all their books through this channel, but they will offer most of them, especially backlist titles and slow-but-steady sellers. At InstaBook the files are converted to a proprietary, heavily-encrypted format and stored on a server. From there, they can be downloaded to a bookstore and printed, whenever a customer orders one. Book files are erased from the hard disk of the InstaBook Maker once the book is printed.

The success of InstaBook in the bookstore market depends heavily on the number of books available via the Digital Bookstore. If customers come into a store asking for a book that the store does not have, it will be crucial to have the title in the Digital Bookstore. An employee who repeatedly looks up such requests in the Digital Bookstore without ever finding the book will gradually stop using the system. This means most books from most publishers will have to be in the system. To do this, InstaBook will have to secure agreements from most publishers (including all the major ones), will have to convert massive numbers of book files, and create massive numbers of book-cover files. This is a daunting task, with many possibilities for failure. Still, Celorio is very optimistic that InstaBook will get it done.

Feedback from users

We spoke with three users of the InstaBook Maker. One was primarily a publisher, one a book production service, and one a bookstore. All were satisfied with their machines, although each had needed to overcome a few problems along the way.

Denlinger's. At Denlinger's Publishers Ltd. (www.thebookden.com), we spoke with Gus Postreich. Denlinger's is an innovative small publisher in Edgewater, FL, that has been active in e-book publishing as well as print. (One of Denlinger's e-books, "Paradise Square" by E. M. Scorb, won the Frankfurt Book Fair e-book award as best e-book of the year 2000.) Denlinger's runs a web site on which its books are sold, and virtually all Denlinger books are produced on an InstaBook Maker. There are about 150 titles on the Denlinger list.

Postreich was the first InstaBook customer, starting in 1999. He says there were some problems in the early going, as there would be with any new machine. But he exchanged the initial machine for another one, the problems have gotten worked out, and now he considers the machine to be reliable. He runs it two or three days a week, producing 10 to 12 books an hour. On occasion, the machine will be making books continuously for 10 or

more hours. Denlinger's sometimes makes over 100 books in a day.

River City Press. Another early InstaBook customer was River City Press in Jacksonville, Florida (www.titanservices.com/rcp/index.htm). Unlike Denlinger's, which plays the traditional publisher's role in taking on the financial risk of producing and promoting books, River City Press is, in most cases, a book-printing service (i.e. a vanity press). River City Press charges \$5.75 per book (with a minimum first run of 100 books) plus an initial \$200 setup fee. After the first run, there is no minimum order. River City Press provides a cover design as part of the price. The customer gets a book as a "first proof", submits changes ("there are always changes," owner George Arnau says), gets a second proof, and then gets a second "proof." After that, River City produces the initial run of 100 copies. If the customer cooperates, River City Press promises finished books within 30 days.

George Arnau has a long association with InstaBook. Arnau's other business, Titan Business Services, is a business machines dealership. It was Arnau that sold Victor Celorio the Kyocera laser printer that was used in his first InstaBook prototype. Later, Arnau visited InstaBook and watched a book being made. That inspired him to get into the book production business himself. Arnau continues to work with InstaBook, supplying printers and sometimes accompanying Celorio on important sales calls or machine deliveries. We paid a visit to his offices in Jacksonville.

River City Press runs its InstaBook machine every day. Typically, between 100 and 175 books are produced on a given day. Arnau expects that River City will exceed the capacity of one machine once he begins marketing the service more heavily, and he has already purchased a second machine. He is about to move to larger quarters—his present space would barely accommodate two machines.

One of Arnau's employees handles the "prepress" aspects of getting a book ready for printing. There are two main tasks. One is checking to make sure the customer has submitted an appropriate file (River City asks for an MS Word file that follows some fairly strict formatting guidelines, but the customer can't or won't always provide it). The other is creating a cover design that is appropriate to the content and that will wrap around the printed book correctly. Any InstaBook user (with the exception of bookstores that do not produce books directly for local authors) will need someone with these skills.

Arnaud reports minimal problems with the machine. At times, there have been difficulties in adjusting the guides that direct the paper through the slitter. This can be an issue when adding a new package of paper, especially if the weight is a bit different from the previous batch. And getting the depth of the glue in the glue pan right, so that the right amount of glue is applied to the spine, also requires some operator skill at times. This problem is most

likely to occur with very thin or very thick books. An experienced operator, though, is able to deal with these problems, so they do not prevent book production.

A careful operator is also the solution for another class of potential problems: an upside-down cover, or no cover at all. Both of these have occurred at River City. An upside-down cover can be ripped off, and the book can be bound again using a new cover, without reprinting the book block. If an attempt is made to bind a book with no cover in place, the book block ends up glued to the machine and the user is faced with a significant cleanup process.

Arnaud emphasizes that careful maintenance, including vacuuming the paper dust out of the machine on a regular basis, will prevent many problems.

River City is different from other InstaBook sites in using a color laser printer (a Xerox 7700) for cover printing. Arnau considers the quality obtained this way to be better than he would get from an inkjet. Another River City offering is cover lamination. The covers are printed at River City Press, sent to an outside supplier for lamination, then brought back for the binding process.

Book Express. The third customer we spoke with was Ann Laird of Book Express, a bookstore in the Canadian town of Cambridge. Her bookstore is the first one (and, at this writing, the only one) to have in-store book-printing capabilities. The InstaBook Maker was installed in November, 2001.

Overall, Laird is pleased with her machine, but she has not yet had occasion to use it heavily. In its first half year of InstaBook production, Book Express has made perhaps 200 books. Some days, one or two are produced, some days none at all. Almost all have been public-domain titles that InstaBook has placed on its server. The bookstore plans to offer printing services for local authors, but hasn't yet begun doing so. It is not yet configured to accept orders through InstaBook's on-line commerce system.

When the machine was first delivered, two employees (of whom Laird was one) were trained on how to use it. Since that time, the machine has been replaced with a newer version, and only Laird is familiar with its operation.

Laird says that the time to download a book from the InstaBook server is usually "just a few seconds" on her DSL line. Longer download times indicate a problem with the line. The machine is normally left turned off. To print a book, Laird turns it on and waits for the printer to warm up. Then she starts the book block printing, turns on the glue warmer, and prints the cover. Once the book block and cover are printed, she does a visual check to see if the glue is liquid (which it usually is unless the book is a very short one). She waits for the glue to become liquid, if it isn't already, and then initiates the binding of the book. After binding, she trims the book using the guillotine cutter. She doesn't try for an exact trim size, but cuts enough away to leave a smooth edge.

Laird reports that her first machine sometimes had problems with uneven gluing. She also had occasional instances of pages getting hung up on the side guides, or getting slit at an angle. These problems seem to have been eliminated in her replacement machine.

Our take

It is difficult to provide a fair assessment of the InstaBook Maker. The company is still making improvements to the machine, so it is a moving target. Talking to users provides the best picture, we think, but it should be noted that a given user does not necessarily have the latest version of the machine. In another six months to a year, we would expect the design of the machine to have stabilized, so that user experiences will be more uniform.

We conclude, based on our conversations with users, that the InstaBook provides an efficient, relatively reliable tool for making books. But the user must be willing to compensate for the idiosyncrasies of the machine. The biggest issues mentioned by users were making sure the right amount of glue gets onto the spine and adjusting the paper guides properly. We think these can both be dealt with by smart, experienced users, though they might prove troublesome in the beginning.

The InstaBook Maker also requires an operator that is paying attention. Neglecting to insert a cover before initiating binding, for example, results in the need for a significant clean-up operation. In a future version of the machine, we hope there will be a sensor that verifies the presence of a cover.

We think the InstaBook Maker is a mature enough design that we would consider installing one if we were setting up our own book publishing operation. We would arrange for a single, competent operator to be in charge of it.

But if we owned a bookstore, and we wanted several different people to run the machine on an occasional basis, we would probably wait to buy one until we were sure InstaBook had gotten all the bugs ironed out. It is a machine that seems to need, for now, a fairly sophisticated operator who is willing to take the time to learn how to make it run well. From what we have seen of the InstaBook Maker, and from talking to users, we think it is not yet the machine that will turn the vision of printing books in every bookstore into reality. But it is getting close.

By contrast, the other component needed for that vision, a digital repository containing a majority of all titles published by a majority of all publishers, is still in its infancy. As more bookstores begin to install machines, having a wide array of books available in a standard print-ready format will become an urgent need. Will InstaBook be able to accomplish this? We have to wonder—the task is vast. But Victor Celorio has shown himself to be a very persistent man, and perhaps he'll be able to solve this problem as well.

Whether it is solved by InstaBook or not, we are confident that this problem will eventually get solved. The book industry needs to develop standards for book files, not just so that books can be printed in bookstores, but also so that they can be delivered as e-books. Standard business models for compensating the bookstore, the publisher, and the supplier of the equipment and the repository also have to be worked out—again, most these issues apply to e-books as well as printed ones.

In the end, all this will get resolved. But things sometimes move slowly in book publishing, and it may take a while. Meanwhile, InstaBook and its competitors have plenty of non-bookstore markets in which to sell and perfect their machines, in anticipation of the day when printing a single copy of an obscure book for a waiting customer in a bookstore will finally be reality.