

Selecting a preservation photocopy machine

By Dorothy W. Wright

Factors to consider when purchasing equipment

Inhouse preservation photocopy is becoming a more common feature of library preservation programs today. Increasingly, librarians are relying on preservation photocopies to replace brittle books in circulating collections, particularly those that are highly used or of local interest. Selecting copying equipment that insures the permanence and durability of photocopied images is a critical aspect of any inhouse preservation photocopy operation. Suitability for production copying is another important consideration. A variety of photocopiers on the market today are capable of producing archival quality copies. Their widely varying features and costs can make a purchasing decision very difficult.

With funding from a U.S. Department of Education Title IIC grant, the A. R. Mann Library at Cornell University began a preservation photocopy program in 1991 to reformat brittle books in Cornell's Entomology Library collection. The process we undertook and the criteria we used to select a photocopy machine are described.

Archival quality and image adherence

For archival quality photocopies¹ it is important not only that the paper used for copying adhere to standards of permanence and durability² but also that the stability of the toner, the carrier, and the fusing process of the photocopier be considered. A Government Printing Office report on archival xerographic copying summarizes studies on the materials used

in archival copying and factors that influence the fix quality of toner to paper.³ Archivability is based upon the individual stabilities of the paper and toner and on the initial strength of the bond between these materials. Time, temperature, and pressure have been identified as the important parameters in hot roll fusing.

The ability to evaluate the fusing property of toner to paper is essential to determining the suitability of a copier for preservation copying purposes. Numerous laboratory tests have been devised to evaluate the fix quality of toner to paper. A simple on-site pass or fail "Tape Pull Test" has been developed that correlates very well with the results of the laboratory abrasion test, ASTM D3458, part 24, "Retention of Print Contrast after Abrasion" for determining adhesion of the image onto the paper.⁴

For this simple procedure, a 3-4" strip of 3M #240 drafting tape is placed on a photocopy of a test target⁵ (a black ring, a black rectangle, and a 1" black strip) covering as much of the black ring as possible. The tape is rubbed 5-6 times with four fingers. The tape strip is peeled off the paper and the adhesive side of the tape examined. If the curved image of the test pattern is detected (i.e., black toner on the adhesive), the copier fails the test and cannot be considered for archival photocopying.⁶ This test was invaluable in determining the suitability of copiers for preservation purposes.

Selection process

We designated a Photocopy Selection Committee (composed of the preservation librarian, preservation technician, and several other library staff members) to evaluate and select our preservation copier. We began by developing a list of required and desirable specifications for the copier. The primary requirement for all

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preservation copy machines was consistently passing the Tape Pull Test. Other required specifications included:

- minimum copying capacity of 50,000 copies per month;
- duplexing capability
- a maximum five-second first copy speed (very important since all preservation photocopies are essentially first copies);
- accurate registration of the photocopied image on each side of a duplexed page (top to bottom and side to side);
- excellent contrast and clarity of photocopied images;
- excellent local service;
- ease of use.

Other desirable features included:

- paper size to 11" x 17" (for copying oversized books and foldouts);
- photo or half-tone mode;
- edge copier for copying bound books.

In addition, we looked at warm-up time, copies per minute, maximum and minimum copy size, paper cassette capacity, toner type, reduction and enlargement range, margin shift, margin erase, and estimated drum, toner, and developer life and costs. Purchase price was also an important consideration since we had a limited amount of money budgeted for the copier.

We found it helpful to solicit advice from librarians managing inhouse photocopy operations and from commercial preservation photocopy vendors to find out what machines were used and why. Although no consensus was expressed among those we spoke with as to the ideal preservation photocopier, it was useful to learn what type of copiers others were using, their level of satisfaction, and features deemed important. Consistently passing the tape pull test, copy quality, cost, service, first copy speed, volume of work, and features such as a photo mode were most frequently mentioned as important criteria to consider.

Vendors

Local photocopy vendors supplied us with sales brochures for brands which met our initial list of specifications. We reviewed the sales literature and independent evaluations (i.e., *Library Technology Reports*) for copiers we were initially interested in. After a close evaluation of the literature and discussion with each vendor,

we narrowed our search to seven models. We visited locations on campus that had these models and, either alone or with the salesperson, tested each copier's archival quality with the tape pull test, copied sample pages from a brittle book to determine copy quality and ease of use, and assessed the suitability of each machine for our purposes. In addition to testing the machines, we contacted the references supplied by each vendor. The references were important in determining the reliability of the machine and the vendor's service reputation.

Testing the machines

We found it extremely useful to test the copiers we were considering under actual working conditions. We arranged to have three machines loaned to us for one-week trial periods. During each one-week trial, four members of the Preservation Unit staff copied brittle volumes

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on a daily basis. This allowed us to get an accurate sense of each machine's suitability for preservation photocopying. An evaluation form was developed to objectively compare each copier (see page 18). We looked at the following factors:

1) Tape pull test—each copier was tested daily and had to consistently pass the tape pull test.

2) Photocopy set-up—we were interested in comparing how easy it was to set up unique templates for each book copied (ease can vary depending on the platen's shape, size, and orientation); whether, when using a template, shadows appeared on the copies and copying workflow (again, dependent on the size, shape, and orientation of the copier and platen). We were also concerned about the weight of the copier lid which is opened and closed repeatedly during the copying process and could become fatiguing over time. We were interested in knowing whether it was possible to move the copier lid back 45° out of the way and to use a lightweight cardboard cover instead.



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3) Copy quality—we wanted to compare the contrast and clarity of the copies on the text, line drawings, illustrations, and photographs. Since we would be copying many scientific illustrations and drawings, this was a crucial consideration. The range of contrast settings is very important in insuring the clearest copy possible, particularly with illustrated materials.

4) Registration—registration is affected by the route the paper takes as it passes through the machine in the duplex mode. Consistently accurate registration is extremely important in producing exact facsimiles.

5) Duplexing speed—we were interested in how quickly the machine could copy both sides of the paper.

6) Copier controls—we wanted copier controls displayed in a clear, obvious, easy-to-use manner. In addition, placement of the controls was another important consideration. We found that the copier controls on some machines would inadvertently and repeatedly be hit in setting up the template and using the machine.

7) Environmental variables—this includes factors such as the heat and noise generated by the machine, and the height, size, and physical aspects that affect comfort in using the copier for prolonged periods.

8) Warm-up time and speed—how quickly the machine warmed up after turning it on and first copy speed were also considered.

9) Any other comments—anything not covered by the above categories or additional notes were included at the end.

Evaluating and choosing

Each factor was evaluated on a scale of 1–5 (1=lowest, 5=highest) with a total of 110 points possible. The four staff members testing the machines completed an evaluation form for each copier. At the end of the test period the results were averaged for each copier. In addition to the copier evaluations, we also considered price, service agreement, and references in our final decision. Of the three copiers we tested (Minolta 5400, Savin 9710, and Konica 4045), we chose the Konica copier with an average score of 96.6 out of 110 possible points. It should be noted, however, that given changing xerographic technology and newer copier models on the market, we might choose a different copier if we were to repeat this exercise today.

The copier met all our required and desirable features except that it did not have a photo mode. Having seen the photo mode on other

machines, we did not consider this to be a serious drawback. The Konica does a satisfactory job of copying photographs and half tone illustrations. The cost of the machine and the service agreement were very reasonable. In addition to a five-year, one million copy warranty, the dealer also agreed to put in writing as part of our service contract that the machine would be repaired or replaced if it ever failed to pass the tape pull test. Other vendors we spoke to would not agree to this added stipulation in the service contract. For archival copying, this is an extremely important consideration and every effort should be made to include this provision in your maintenance agreement.

Conclusion

We have found that an excellent service agreement and reliable repair technicians are among the most important factors to a successful preservation photocopying program. To maintain optimal copy quality, the machine must be serviced more frequently than a regular office copier. In addition, preservation photocopying

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with repeated, individual, duplexed copies seems to cause more wear and tear on a copier than the single or multiple copies typically made in general office copying. When selecting a preservation copier, be sure to look carefully at the manufacturer's claim of minimum monthly copying capacity to accurately gauge the copier's durability over time for your projected volume of copying.

Although it is impossible to fully anticipate the dependability and durability of any copier you purchase, there are many important factors to consider when evaluating copiers for a preservation photocopy program. Once the archival quality of the copier is established, a careful evaluation (including an inhouse trial period) of copy quality, registration, speed, cost, service, monthly copying capacity, and other features of several copiers can be undertaken using an evaluation form to compare each. Using references to ascertain the reliability of

Copier evaluation form

Copier: _____

Dates tested: _____ Salesperson: _____

I. Tape Pull Test (done daily during demo)

Date		Pass/Fail
_____		Pass/Fail

II. Photocopy setup

1. Ease of template use with platen
1 2 3 4 5
2. Shadows?
1 2 3 4 5
3. Weight of copier lid
1 2 3 4 5
4. Ability to move copier lid out of way
1 2 3 4 5
5. Use of cardboard cover
1 2 3 4 5
6. Workflow
1 2 3 4 5

III. Copy quality

- | | Contrast | | | | | Clarity | | | | |
|------------------|----------|---|---|---|---|---------|---|---|---|---|
| 1. Text | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| 2. Line drawings | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| 3. Photos | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |

V. Registration

1 2 3 4 5

V. Duplex speed

1 2 3 4 5

VI. Copier controls

1. Display
1 2 3 4 5
2. Ease of use
1 2 3 4 5

VII. Environmental variables

1. Heat
1 2 3 4 5
2. Noise
1 2 3 4 5
3. Height/Comfort
1 2 3 4 5
4. Size of machine for space
1 2 3 4 5

VIII. Other

1. Warm-up time
1 2 3 4 5
2. Copy Speed
1 2 3 4 5

the product and service reputation of the dealer are also very important. This systematic, comparative approach to preservation photocopy selection was invaluable in determining the most suitable machine for our needs.

Notes

¹The ALA ALCTS RLMS Copying Committee will soon publish *Guidelines for Preservation Photocopying* which describes procedures for producing preservation photocopies.

²Applicable standards are ANSI Z39.48-1984, Permanence of Paper for Printed Library Materials; ASTM D3290-86, Bond and Ledger Paper for Permanent Records; ASTM D3458-85, Copies from Office Copying Machines for Permanent Records.

³Sylvia S. Y. Subt and John G. Koloski, *Archival Xerographic Copying: Special Develop-*

ment Study for the National Archives and Record Administration, GPO Jacket no. 484-988 Final Report, August 25, 1987 (Washington, D.C.: GPO, 1987).

⁴Norvell M. M. Jones, *Archival Copies of Thermofax, Verifax, and other Unstable Records*, National Archives Technical Information Paper no. 5 (Washington, D.C.: National Archives and Records Administration, 1990).

⁵The test target may be obtained from the Special Media Preservation Branch, National Archives, Washington, DC 20408. Contact Steve Puglia at (202) 501-5370 for current cost and ordering information.

⁶It should be noted that some copiers can be modified to pass the tape pull test by adjusting internal pressure and fusing temperature to increase the degree of adhesion of toner to paper. ■