CHAPTER 7

Custom-Built Furniture and Equipment

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Although much of the equipment and furniture used in book and paper conservation labs may be available commercially, some items are best custom-made to suit individual needs and applications. At some point it is likely to become frustratingly apparent that the desired cabinet or sink or table is simply not available on the market. Washing sinks, workbenches, storage furniture, and specialized adaptations for book presses, encapsulaters, and cutting devices are all areas that may be best approached with custom designs. Contracting to have furnishings custom-built can result in the satisfying long-term convenience of having exactly the right features—or the constant annoyance of living with mistakes that can not be easily corrected.

This chapter looks at design for custom-built furnishings, materials choice, and the process of working with craftsmen outside the lab. The chapter finishes with a series of case studies showing design, decision-making, and results for some custom-built projects for book and paper conservation labs.

WHY GO CUSTOM?

The primary reason to look to custom work is to have furnishings that exactly fit the space or the purpose—tables with small drawers for tools and large flat drawers for paper and blotters; workbenches with a built-in light table or recessed nipping press; a sink with a heating jacket for gelatin sizing or enzyme treatments; moveable tables that can easily be butted together to accommodate oversized objects (see figure 7.1). Custom furnishings may be designed to break down for easy moving to a new location at a later date, or they may be built into a specific space.

In some situations custom-built furnishings may be cheaper than those on the market, or economies may be achieved by modifying a commercial product to suit a particular need (see figure 7.2).

FIGURE 7.1
Custom-built conservation worktable has room for flat storage underneath and casters for flexibility. Northeast Document Conservation Center. Photo by Shannon Zachary.

FIGURE 7.2
Rolled goods storage at the Northeast Document Conservation Center uses a custom assembly of standard products. Photo by Shannon Zachary.

DESIGN—KNOWING WHAT YOU WANT

The first task in contracting custom furnishings is developing the concept of what you need and what you want. What problems must this furniture solve? One of the best sources of information comes from visiting established conservation labs, looking at the furniture, and talking with the people who use it on a daily basis. Always ask the question, what would you do differently if you had the chance to redesign it?

Below is a checklist of things to think about when considering furniture. This list is intended to be suggestive, not exhaustive.

- How will it be used? What operations will be performed? One function or several functions?
- How much weight does it have to support?
- What materials will be stored here? Does this material come in common or standard measurements?
- By whom will it be used? One person or many different people?
- Consider ergonomic concerns: Height of the surfaces; distance of reach for common tasks; weight of anything that must be lifted, pushed, or moved.
- Will the person be working seated or standing? Or both? (Design the height accordingly; if for standing work, allow room for toes to extend in under the table; if for seated work, design in a kneehole.)
- What supplies or materials are needed in relation to the task? Is there a place to keep them close at hand?
- Consider all the needs of the person working here, not just the core task-related operations. Will the person need a lockable space to store work in progress? A lockable cupboard or drawer for a purse or personal belongings? Space for a computer terminal? A place to hang a coat?
- Will it be stationary? Will it occasionally move to a different location? Will it need to move frequently around the lab?
- Is the floor nicely level, or must the furniture accommodate unevenness?
- Open shelving or closed cabinets and drawers? Open shelving makes it easy to see what is where, but it can be messy and dust-prone.
- Does it need electrical hook-up? Task lighting?
- Does it need plumbing hook-up?
- Does it need noise control (e.g., for a compressor or vacuum motor)?

- How will the furniture and surroundings be cleaned? Does the furniture need to be raised off the floor or disassembled to permit cleaning?
- How will the furniture be moved into or out of the lab? Consider door widths, stairs, and clearances along the entire route. Does the item have to be designed to break down for moving?
- How long does it need to last? As long as the lab exists in this space? As long as the machine it supports?
- What is the budget? Are there cost-cutting measures that can be considered? What compromises are acceptable and what is absolutely necessary?

Sketch out the end product you have in mind. Even if you are not skilled at drafting, a sketch with measurements and notes makes an excellent starting point for discussion with the fabricator or carpenter. Like conservators, fabricators tend to be strongly visually oriented. The builder may want to rework those sketches into a form that is comprehensible to him or her and will ask you to sign off on the reworked design. Study the revision carefully before signing.

MODIFY AN EXISTING COMMERCIAL PRODUCT?

Before designing furniture from scratch, it is worth considering whether an existing commercial product might be modified to meet the need at less expense. Here are some examples.

A custom-built top across two commercial map cases addresses the need for a large worktop and lots of flat file storage drawers (see figure 7.3). The disadvantages are limited height adjustment (although the table can be built up slightly to a standard lab table height), lack of kneeholes for seated workers, lack of toe space (so the worker can move in close to the table), and lack of mobility.

Casters added to an ordinary table make instant flexible work space or an impromptu cart for large flat objects.

An old wooden library study table fitted with book clamps permits poulticing and scraping six book spines at a time. Added wooden risers on the legs bring the table up to a height that is easier on the conservator's back.

A small, but sturdy, wooden pallet with a cushioned floor mat on top makes a moveable riser to boost shorter people working at a high table.

FIGURE 7.3
A custom-built tabletop spread across two commercial map cases creates a large work space and flat storage for paper and other supplies. Note the gap between the two banks of cases that allows a kneehole for a seated conservator. University of Michigan Library. Photo by Shannon Zachary.

An old drafting table (reinforced to support the weight safely) makes a slant surface for a Minter polyester welder.

Standard half-size office filing cabinets on wheels (the type designed to go under a desk) provide moveable drawers and a low storage top that can be wheeled to the worktable or tucked away underneath the bench in a space designed for it, and so avoid the need to have custom-built drawers. A tray can be placed on top of the unit to keep bottles and supplies from rolling off.

If the plan is to incorporate off-the-shelf elements into a custom design, make sure to measure carefully. If possible, purchase commercial elements first and recheck all measurements before finalizing the design.

HOW MUCH FLEXIBILITY?

One of the reasons to look to custom-made furnishings is the option to build in flexibility. Consider carefully what is really necessary, however: Flexibility is expensive. Common examples of flexibility are adjustable heights for tables and work surfaces, expandable work surfaces, and adjustable shelves. If making the adjustment is difficult—requiring heavy lifting or complicated manipulation of parts—workers will rarely take the trouble to actually adjust the furniture and that investment will be wasted.

Adjustable table height is one commonly desired element of flexibility: Conservators come in many different heights and sizes. A pneumatic table lift may be easy to use, but is expensive to build. Leg extenders with a button and telescope feature are cheaper but more complex to adjust; the table must be cleared and tilted on its side to manipulate the legs.

Gateleg table extensions can provide useful instant extra tabletop space. The leaf in the drop position may, however, get in the way of the knees of a seated conservator.

Often paper conservators want a sink big enough to accommodate the largest map or artwork likely to come to the lab. Very large sinks, however, can be inconvenient for routine, normal-sized projects. If large pieces are not commonly part of the work stream, a more modest-sized sink may be installed; the occasional oversized item can be accommodated in a frame of 2 x 4-inch lumber covered with polythene sheeting.

MATERIALS

When selecting materials for custom furniture, consider carefully how long the furniture needs to last and the wisdom of the saying, “we’re too poor to buy cheap.” Inexpensive materials, hardware, or wheels may reduce the initial cost of the project but could prove expensive in the long term as they fail and need to be replaced.

Wood, Plywood, and Particle Board

Wood is often used for furnishings because it is easy to obtain and work and can produce a pleasing, warm appearance. Hardwoods (beech, birch, oak) are used for table legs and braces; softwoods may be substituted if less durability is acceptable. Plywoods and fiberboard may be used for furniture construction, but with caution. Check that the plywood is solid. A heavy weight set down on a tabletop made from plywood with a thin veneer and soft interior can break right through the thin exterior layer, leaving a large gouge. Medium density fiberboard (MDF) may be used for constructing lab furnishings, as it is more dense and heavier than plywood. Some fiberboards are prefinished with plastic laminate surfaces so they can be readily made into tabletops, shelves, or other applications.

If wood, plywood, or particle board is being considered for the construction of storage (shelves, drawers, cabinets) for artifacts or materials that become part of the artifact, make sure the wood is sealed. Certain woods, unfinished oak and softwoods especially, off-gas acids that can migrate into paper; plywood and particle boards may also off-gas formaldehyde or other byproducts of the adhesives used in their construction. Build in a barrier between the wood and the books or paper being stored: Seal the wood with a water-based polyurethane, line shelves or drawers with a barrier film or foil (such as Marvelseal), or at least place a sheet of heavy, alkaline-buffered paperboard stock between the wood and the materials stored. Select low VOC (volatile organic chemical) acrylic latex paints. Consult the literature on the construction of exhibit cases for up-to-date advice on suitable materials and finishes. *Consumer Reports* magazine and the related subscription website regularly publish comparative tests of indoor paints, including information about which brands or types are low VOC.

Selection of wood and finishes that are confined to areas of the furniture that do not typically come in prolonged contact with the books or paper being stored—such as the legs of a table—is less critical, because most off-gassing from these areas will be diluted by the large volume of air in the lab and will dissipate over time. It is important, however, to discuss wood and finishes with the fabricator and agree exactly what will be used. A carpenter used to making kitchen counters, for example, may automatically choose to oil the wood as a finish and preservative—an excellent option for food preparation but disastrous for a paper conservator!

Stainless Steel

Conservators may consider stainless steel for tables and will most likely select it for custom sinks. The thickness of sheets of stainless steel are classed by gauge; the higher the gauge number, the thinner the sheet metal. An appropriate thickness for construction of a stainless steel sink is 14 gauge (.078 inches thick). Stainless steel type 304, a multi-purpose stainless steel that combines excellent weldability with good corrosion resistance, is the type most likely to be used by the fabricator unless you specifically ask for something different. Stainless steel may be molded or welded. Molding is more expensive, but results in seamless rounded edges that are easier to keep clean and corrosion free. Welding may be more practical, especially for large fabrications.

Work Surface

What is the best surface for tables and workbenches in a book and paper conservation lab? For most conservation operations it is necessary that the surface can be washed—and occasionally scrubbed. At a minimum, it will need to withstand prolonged wet treatments and may need to resist some organic solvents. Resistance to heat, abrasion, impact, and bacteria may also be important. Stone and glass may chip; these and stainless steel can be cold to work on for long periods of time. Wood must be finished to seal it from water damage. Plastic laminates are likely the best option for economy and the right features.

Conservators debate the best color for work surfaces. Designers of kitchens and other work areas often deliberately choose a light-colored patterned finish so minor flaws, stains, and dust do not show; the conservator usually wants a surface that *does* show the dirt, such as a solid, dark color, so the dirt can be cleaned away before damage is done. Small pieces of tissue prepared for a repair, needles, and other small tools are easily lost on a pattered or wood-grained surface. White and other light colors are often considered "clean," but they offer poor contrast to paper, blotters, and other common materials with which the paper or book conservator works. The traditional Chinese scroll-mounting lab has tables with a deep red lacquered finish; the work at hand shows up in bright contrast and the colored table even acts as a light table to help the conservator see how thin a paper is or spot gaps in a repair. Black provides a similar deep contrast. Some years ago a major book and paper lab had their tables finished in a deep, solid green, because green was considered especially restful on the eyes.

One problem with a solid, dark finish in a plastic laminate is that it will quickly show scratches and other blemishes. If possible select the material for scratch-resistance or consider specialized finishes designed for scientific labs that are scratch-, chemical-, biological- and heat-resistant.

Squared bench edges are more useful in a lab than rounded ones. Squared edges give useable work surface right up to the perimeter of the bench and can provide an edge for rough tearing paper.

Wheels and Casters

Best quality wheels are an investment that will pay back. Economies, when necessary, should be sought elsewhere. Inadequate wheels can create years of frustration or the expense of redoing the project after a short period of time. Because good-quality wheels are expensive, the fabricator may try to save costs by selecting cheaper options. Either select the wheels yourself or make sure the specifications for them are part of the written agreement for the design.

Before trying to select wheels you will need to know the following:

- What is the maximum weight load they will need to support? (Estimate high.)

- What surface(s) will the wheels traverse? Tile floor? Cement? Carpet? Outdoor walks or dirt?
- Will the wheels need to roll over bumps or irregular surfaces?
- Do the wheels need to swivel? Two fixed and two swivel, or all four swivel?
- Do the wheels need to lock for stability?

Hard wheels are easier to push on smooth surfaces; slightly soft wheels are less noisy; pneumatic wheels may be needed for rough surfaces. Larger wheels handle bumps and roughness better than smaller ones. The combination of two fixed wheels and two that swivel is often recommended to give small carts better stability. Four wheels that swivel make it easier to maneuver carts or tables into and around tight spaces. Locks that can be set and unset with the tip of a foot are easier to use than swivel bars that often require manipulation by hand.

If the furniture leg is made of wood, casters with plates and holes for anchoring four screws are more stable that those with stems that slide into a hole in the furniture leg. The hole drilled in the wooden leg to accept the stem gradually wears away, allowing enough play for the wheel to bend or slip out. Casters with screw plates may require a larger leg, however, to accommodate the plate. Metal legs can better accommodate the stem-type wheels.

FINDING A FABRICATOR

Who will build the custom furnishings? Finding the right person entails all the skills you may have learned from helping other people find a conservator or from a home improvement project. The best leads are usually recommendations from people who have recently hired someone for a similar project—just be sure that the project and expectations are indeed similar. Shops that sell the raw materials—a good quality lumber yard or hardware store—may be able to put you on to local talent. For sinks, check out fabricators for the restaurant trade or other industrial applications. If necessary, an Internet search will at least produce a list of names to investigate further. In addition, even national or international manufacturers of conservation equipment and supplies are often happy to work with new ideas as it can provide them with a new sales line if proven successful.

Whatever route is used to find them, go the extra step to investigate the fabricator's capabilities and reliability. Ask to see examples of similar projects. Ask for—and check—references. Check standard sources such as the Better Business Bureau or state licensing. Ask several fabricators to bid on a job and compare the responses carefully. Beware the proposal that seriously underbids the competition.

Conservators who work in large institutions or universities may find that they are required or encouraged to use the in-house shop. Building an ongoing relationship with in-house carpenters and fabricators can be rewarding, and the mechanics of contracting and payment are often much simpler, which is a cost savings. Beware, however, of in-house contracting agreements that are too simple: It is still best to make sure that the specifications of the project are agreed on in writing. Also, do not assume that the in-house shop will always provide the best price. If the organization permits, compare in-house pricing with external providers, always keeping in mind the hidden costs of managing external purchases—the time commitment for putting the project out to bid, for example.

WORKING WITH A FABRICATOR

Conservators may feel some advantage working with a carpenter or fabricator—in many ways this professional looks comfortably similar to a conservator. Both work intimately with specialist tools and materials in three dimensions. Both engage in problem-solving and developing proposals for specific jobs.

The builder brings expertise in materials and structure. Make use of that expertise but watch out for differences in assumptions. For example, a woodworker is likely to think of problems in terms of wood and not consider that some other material might be best in your situation. A carpenter who usually makes cabinets for kitchens may automatically design drawers with sides that do not reach up the entire height of the drawer. The conservator may have a clear vision of where quality is more important than economy; the fabricator may assume the customer always wants the most economical option. Take the time to sit down with the fabricator to review the design and explain why the specific features were chosen or what function the finished product must perform. Ask for suggestions to solve design problems and ask for explanations why each material or structural element is proposed.

THE CONTRACT

While communication with the fabricator may begin with conversations and rough sketches, at some point a written proposal document should be prepared and signed by both parties. Elements that might be included in this document are:

- Design and measurements, including shop drawings, as needed.
- Materials: these specification should be detailed, including brand names (with the stipulation of no substitutions, if necessary) and/or the specific qualities required of the materials.
- Responsibility for related support. For example, does installation of a sink also include connecting the plumbing or (more likely) does another professional need to be called in to prepare the connection before delivery or to connect it afterwards?
- Delivery requirements and charges. Will delivery require a raised loading dock? On-site installation work by the fabricator?
- Costs. Is the price quoted an estimate or a firm quote? How will adjustments to this quote be handled if changes are made to the specifications?
- Time. When will the product be delivered? How will delays be handled?
- If the project is not satisfactory, how will corrections be negotiated?

The fabricator may reasonably ask for a down payment up front, especially for a large job or special-order materials. Take care, however, not to pay the full amount until the item is delivered, inspected, and found satisfactory; then pay promptly.

CASE STUDIES

The following four case studies are detailed to show the process of designing and specifying custom furnishings for a book and paper conservation lab.

Press Boards for Binding

The book conservation lab at the University of Michigan needed an abundance of press boards. Below are the specifications for a set of press boards as given to the carpenter, followed by notes explaining why each element is desired.

Specifications

AA 9-ply (1/2-inch) Finland birch plywood, cut to size indicated, surface grain long; hand-sanded finish. Sizes: 6 x 10 inch, 9 x 12 inch, 12 x 18 inch, and 18 x 24 inch.

Notes

AA birch plywood: cross-ply plywood construction reduces the risk of warping as compared to solid wood; hardwood layers throughout reduce the chance of pressing dents into the boards as could happen with plywood made from thin veneer sides and softer core; AA designates plywood with no or minimal patches in both the outermost layers so the boards are less likely to mark the books being pressed.

Surface grain long: looks better, is less likely to warp awkwardly, and is easier to sand.

Unfinished: the unfinished surface can help wick away minor amounts of moisture from the press pack; over time glue and dirt is removed from the surface of the press board by sanding.

Hand sanding/finish: it is important that the edges of the boards are not chipped or excessively rounded, as may happen if they are finished on a machine sander.

The graduated sizes specified are based on common book sizes; the three larger sizes are designed so the smaller size is exactly half the dimensions of the next larger board.

Before the order was placed the carpenter ordered samples of birch plywood used for die cutting applications, and conservators chose one, the Finland ply in the specification, as best meeting the need.

Table for a Microscope

The purchase of a reflected light microscope at the University of Michigan Library prompted the need for a table to put it on. This table is designed to be narrow and on wheels, so it can be moved as needed to individual workstations. The height of the table matches the standard height of other work surfaces in the lab. Drawers hold the inevitable bits and pieces that are used in conjunction with the microscope: instruction booklets, dust blower, lens and dust covers, camera attachment, microscope slides, and the like (see figure 7.4).

Specifications

Construct a rolling table with drawers to the following dimensions:

Top: 6 feet x 24 inches

Total height floor to top: 38 inches

Cross brace: 10 inches from floor

Top: sturdy plastic laminate, matte black to match other tables in lab

Finish for wooden legs, apron, and brace: polyurethane

Customer will supply the four casters for this table

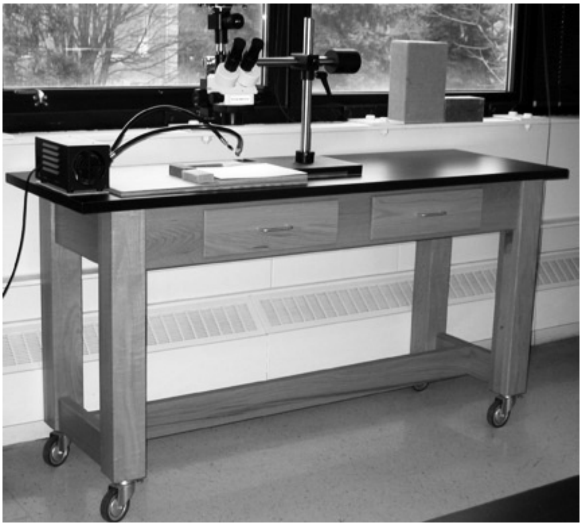

FIGURE 7.4
Rolling table for a reflected light microscope. University of Michigan Library. Photo by Shannon Zachary.

Diagrams of the table sketched by the conservator who designed it were attached. The written specifications could have been improved by giving brand names for the laminate top (the finish was later selected from swatches offered by the carpenter) and the finish for the wood. The hefty 4 x 4-inch legs proved necessary to accommodate the plate of the casters. The brace is designated as a height from the floor, because the height allowance needed for the casters was not at first clear. The brace position and height was designed to allow a seated conservator to move a stool in close to the table. The conservator selected, purchased, and supplied the casters: This strategy proved easier than writing detailed specifications for them.

Workbench for a Book Conservator

The University of California (UC) Berkeley book conservators wanted workbenches with storage for tools, supplies, works in progress, and documentation combined with flexibility for varying the location and configuration of the drawers under the bench. The concept was to rest the table top on two drawer units (pedestals). One unit has drawers sized to take standard letter-size hanging file folders and tools, the other has larger drawers for supplies and work in progress. Each drawer unit rests on a separate removable base, sized according to the bench height needed for each conservator. The whole assembly can be readily taken apart and reconfigured (see figure 7.5).

Specifications

Benchtop rests on top of two separate pedestals. Do not fasten bench to drawer units.

Dimensions of top: 100 inches wide x 38 inches deep x 1-1/2 inches thick

Plywood top with Wilsonart 1572-6 Antique White laminate

Solid oak benchtop edges all around to protect edges of the laminate

Wilsonart laminate to be beveled only

First drawer unit:

Exterior dimensions: (precisely) 32 inches high x (approximately) 17-1/2 inches wide x (precisely) 34 inches deep

FIGURE 7.5

Workbench for a book conservator. The base units, in two styles with different configurations of drawers, are designed to mix and match style and location. University of California Berkeley Doe Library. Photo by Jim Boydstun.

This unit consists of two letter-size Pendaflex file drawers and a top drawer with a minimum interior height of 4 inches with inner dimensions as follows (working from the top down).

1 drawer: 3-1/2 inches high x 12 inches wide x 30 inches deep

2 Pendaflex drawers: 10 inches high x 12 inches wide x 30 inches deep

The first unit rests on a separate removable base measuring: 4 inches high (or more, depending on desired working height) x 14 inches wide x 30 inches deep

Second drawer unit:

Exterior dimensions: (precisely) 32 inches high x (approximately) 45-1/2 inches wide x (precisely) 34 inches deep

This unit consists of 6 flat file drawers with inner dimensions of (working from the top down)

1 drawer 3-1/2 inches high x 40-1/2 inches wide x 30 inches deep

1 drawer 7-1/2 inches high x 40-1/2 inches wide x 30 inches deep

4 drawers 1-3/4 inches high x 40-1/2 inches wide x 30 inches deep

The second unit rests on a separate removable base measuring: 4 inches high (or more, depending on desired working height) x 42-1/2 inches wide x 30 inches deep

Notes on drawer units

All drawer slides should be able to hold a weight of up to 100 pounds

Hardware: Colonial 752-3 brass handle

Slides 230 E (maximum weight 100 pounds)

File drawers: to fit letter size, Pendaflex hanging folders

Exterior: red oak veneer plywood and solid

Finish: oil and satin urethane

Separate removable base on each drawer unit.

The facings on the drawers as built (and shown in figure 7.5) are deeper than the drawer measurements specified.

Table for a Minter Polyester Welder

William Minter first designed and built an ultrasonic welder for polyester film encapsulation of documents in the 1970s and has continuously modified and improved the design since. The Minter welder plays a prominent role in many conservation labs nationally and internationally. Over the years, conservation labs have designed a variety of solutions for setting up specialized workstations around the welder. The University of Michigan Library lab designed and commissioned a table for their welder in 1998, basing the design on prior staff experience and notes provided by Minter. Five years later, Heather Nichols and Gillian Boal at the UC Berkeley lab, after consulting with Michigan about their experiences, designed and commissioned the table described here. This case study tracks through the concept and design process for the creation of a highly specialized piece of furniture specific to a conservation treatment operation.

Concept

The Minter welder is composed of three major parts: (1) the core piece with the welding head and track; (2) two stainless steel work surfaces of different sizes that may be clipped onto the core piece in different configurations; and (3) a control box.

The most delicate part of the machine is the welding head assembly; the workstation must be designed around the need to minimize jostling or bumping the welding head. Because the section with the welding head and track weighs approximately 175 pounds, the workstation must be designed so that this section is secure and does not need to be moved once it is fixed on the table.

The stainless steel work surfaces, one measuring 16 inches and the other 24 inches by the full width of the welding track, may be clipped to the front of welding head assembly either alone or the two chained together, depending on the size of the object being encapsulated. The stainless steel allows the user to hold the work in place with large magnetic blankets—the efficiency of having the magnetic blankets hold the work in place and expel all excess air from the encapsulation packet is a significant factor in the superior results of the Minter welder system. The work surfaces are heavy (approximately 75 pounds together) but require access to allow them to be swapped around depending on the job. When only one surface is in use, the other must be stored somewhere. A shelf was incorporated into the table design so that these heavy work surfaces could be stored locally and did not need to be moved far.

The control box, by comparison, is light—approximately 15 pounds. Experience showed, however, that the welding process works better if the controls are constantly visible to the operator during welding.

Finally, the welder has numerous small accessories that are most convenient if they can be kept close at hand to the workstation: the instruction and maintenance binder, shims and tools for fine adjustment of the welding head, magnetic blankets and strips in a variety of sizes; gloves or finger cots (glove tips for fingers) for handling polyester film; dust cloths; and samples of encapsulation to show visitors touring the lab. To accommodate these accessories, a drawer was placed underneath the work top.

Experience using the welder has demonstrated that a slanting surface makes it easier for the operator to see the weld line (the operator must distinguish a narrow translucent weld line from the clear, reflective polyester around it), especially for repetitive welding of large numbers of smaller documents. An angle of 14 degrees (1:4 slope) was found to be the maximum practical slant; on a steeper angle the slick polyester film tended to slide down the table. Similarly, sighting the position of the weld is facilitated when the operator moves in as close as possible to the weld head, which is one reason why the machine is designed with different size stainless steel work surfaces—using the smallest configuration for the job makes the work easier. A slanting surface also makes the work set-up easier for a seated operator; the operator may prefer to sit when encapsulating long runs of smaller documents, such as the pages of an entire book. On larger encapsulation jobs—posters and maps—a surface height slightly lower than standard standing-height workbenches helps the operator see the weld line.

Building in adjustability for the height of the table or the angle of the slant could further increase the flexibility of the workstation. This option was considered and rejected because of the expense and because of the weight of the machine: Experience in other labs had shown that even where such flexibility was available, operators rarely made use of it. Also rejected was the idea of sliding the whole welding track down the slant to bring it closer to the operator when the smaller stainless steel work surface was used. The fragility of the welding head was a concern. Every additional option to shift the welder meant increased risk of damaging the head in an accident. Putting the entire workstation on heavy-duty locking casters opened options to move the whole set-up to a different part of the lab or a different room in the building without having to lift or slide the machine itself.

Michigan lab staff designed their table so the lower end of the slant was level with the standard height of the lab tables, to allow the whole workstation to be wheeled up to a lab table and to extend the supporting surface in for exceptionally large work. This decision was a mistake: The height positioned the welding head much too high for almost all staff, and in 10 years this option for extension has been used just once.

The sketch in figure 7.6 shows Michigan's original concept for the welder table. The core section supports the welding head and track and the narrower of the two stainless steel work surfaces. A raised shelf in one corner holds

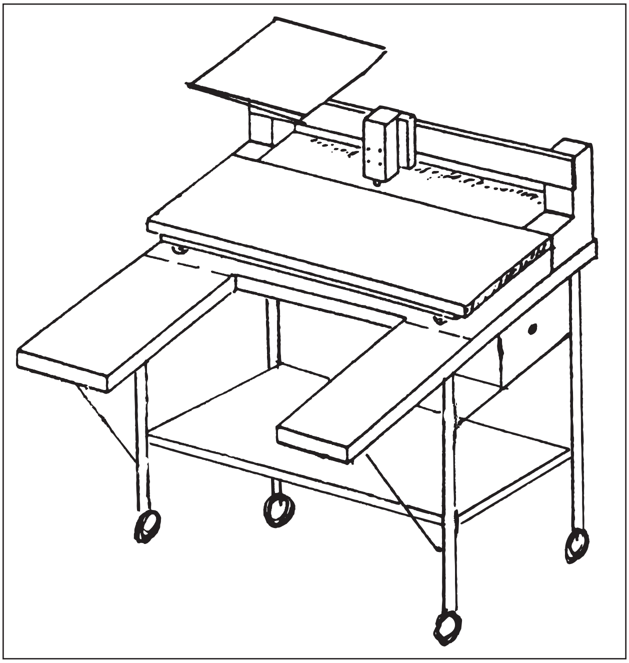

FIGURE 7.6
Rough design concept for a table for a Minter ultrasonic welder.
University of Michigan Library. Sketch by Shannon Zachary.

the control box where the operator can see it while welding. A shelf under the machine can hold the second stainless steel surface when only one is in use. Drawers at each side hold the paraphernalia associated with using the welder. At the front are two gateleg flaps, which support the larger stainless steel surface or both surfaces, when they are clipped together. The flaps can be dropped out of the way when only the small surface is used. With the flaps down, the table can be rolled edgewise through a standard 34-inch door. The whole table rests on four sturdy casters appropriate for linoleum tile flooring, all designed to swivel and lock, and selected to hold a total weight of more than 500 pounds.

The UC Berkeley design reduced the height, relocated the drawer to the front, and both widened the two side pieces and made them fixed (see figure 7.7). The side pieces were finished in stainless steel set on a level with the welder work surfaces and so extending them. Two narrow pop-out blocks of stainless steel at each side of the welder's work surfaces permit access to clip and unclip them when changing out the different sizes.

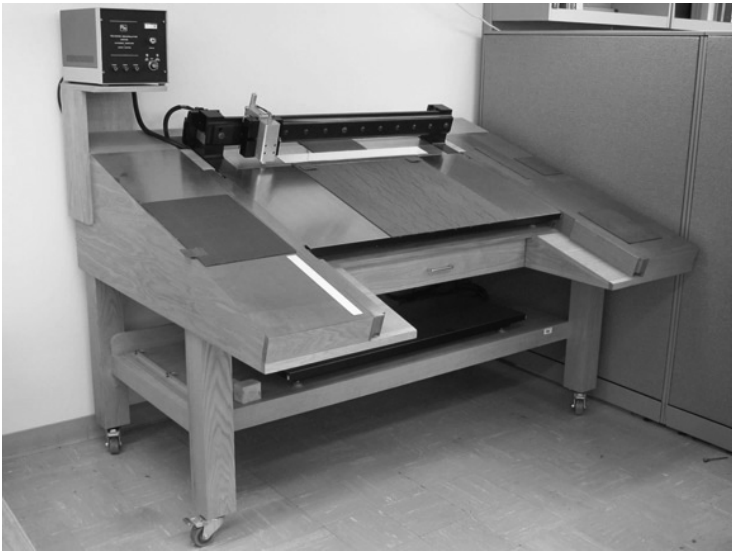

FIGURE 7.7

Table for a Minter ultrasonic welder. The stainless steel surfaces supplied with the welder fit between two stainless steel finished sides; narrow stainless steel finished strips bridge the gap between the sides and the welder surfaces, allowing access to change them out. University of California Berkeley Doe Library. Photo by Jim Boydstun.

Specifications (UC Berkeley)

Base: 1/4-inch solid red oak, 3-inch solid red oak wood apron; a block of wood under the top underside to hold it up

Shelf: red oak plywood shelf to fit a 16 inches x 46 inches platen, with a 3-inch back lip to prevent the platen from falling off at the rear

Case: 3/4-inch red oak plywood with solid red oak edge; top of case to be magnetic stainless steel with dropped down section for welder to sit in, in red oak plywood

Removable blocks faced with stainless steel to match the top of the case

Drawer: 1/2-inch prefinished maple ply with 3/4-inch solid red oak front

Drawer guides: Accuride #3864

Handles: Brass D pins 3-1/2 inches wide set 4-1/2 inches in from either end (2 handles); the drawer handles must be recessed behind the table edge to prevent knocking against them

Legs: solid red oak 4 x 4 inches

Finish: Catalytic Conversion Varnish (Sherwin Williams), two full coats and one or two sealer coats

Fabricator's Shop Drawings

The carpenter for the UC Berkeley table (Lignum Vitae of Oakland, California; http://lignumvitae.com), took the conservator's specifications and transformed them into shop drawings (see figure 7.8). A set of four shop drawings described the construction in three dimensions, establishing all measurements and materials.

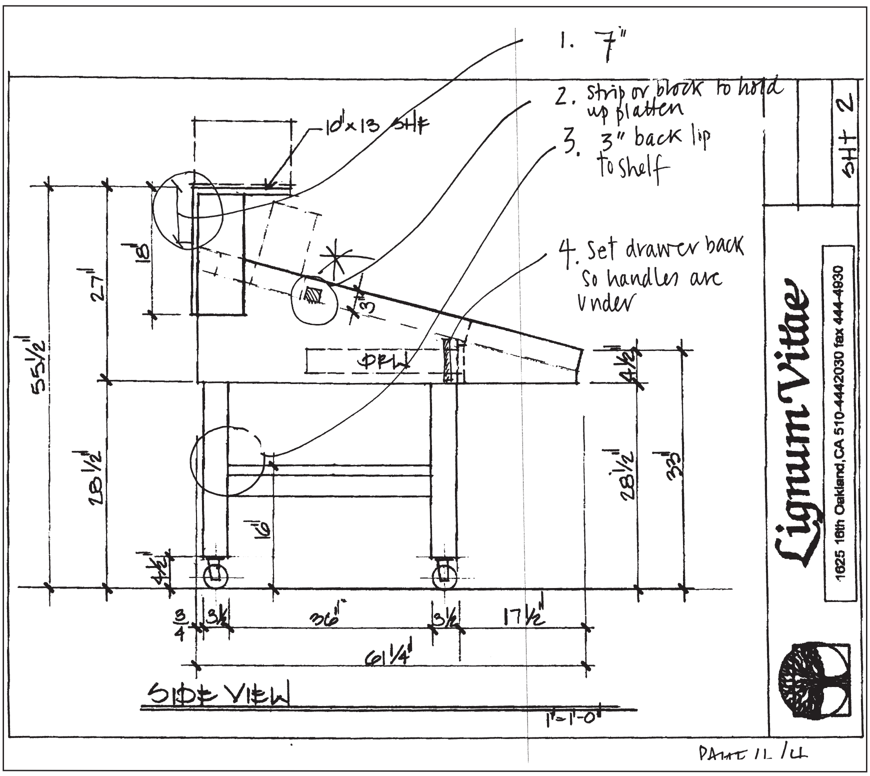

FIGURE 7.8

One of four carpenter's shop drawings for a table for a Minter ultrasonic welder, showing side view. University of California Berkeley Doe Library. Drawing by Jim Martin of Lignum Vitae.

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