



Timothy Moore in his studio with one of his moulds in front of his loom. October 2017.



David Reina with new dry box (stack dryer) and two-pound beater in his shop. May 2017.

The Toolmakers – Those Who Build So We Can Make

Part I: Timothy Moore and David Reina

Aimee Lee

INTRODUCTION

When I first learned to make paper, it was in a studio that housed a range of tools from warped pine moulds with polypropylene screening to two brass wove moulds that everyone wanted to use because they made more reliable sheets. The beater room housed a workhorse Valley/Voith beater and a Reina two-pound stainless-steel beater whose lid opened for easier cleaning and maintenance. We did not talk much about the value of these tools, nor about who made them. Commonly, in academic settings, students (including me) take everything for granted. Time limitations prevent deep exploration of the intricacies of tools and equipment. Many students enjoy their introduction to papermaking but do not continue in the field. Finally, the process of pulling sheets of paper at the vat can be so captivating that students tend to fixate on sheet formation and prefer that to any other activity – to the point that some students expect all the steps prior to filling the vat to be completed before they arrive.

It may be beneficial to students, at first, to know little of the tools they use when learning. They have freedom to practice without the worry of damaging expensive equipment. Part of learning a new technique or technology is the cumulative understanding of the tools and equipment that make the work possible. At first, they are almost invisible to the user because the end product, the paper, is so bewitching. Over time, papermakers notice how qualities of different tools affect their paper, and make changes in their work habits, but also improvements to their equipment to achieve better sheets. I only noticed the way students bang tools around nonchalantly because my first work-study job in the studio was to maintain those tools. Any hard work I had invested in resewing a screen, refinishing boards, or cleaning could be reversed instantly in a moment of carelessness.

In educational settings, most tools are inexpensive and easily replaced. By keeping expensive or rare tools out of the hands of novices, a studio manager can avoid excess wear and tear or outright mishandling. Certainly toolmakers understand that their tools must withstand certain thresholds of wear and tear, and build them to handle that type of stress. However, with student-appropriate tools, beginners can focus on practicing motions instead of hindering the rhythm of working by being too precious with the tool at hand. It took me a few years as a teacher to realize that beginners do not need to use the most authentic and high-quality tools. I saw that they did not have the skills to manipulate them, so the potential for failure was twofold: they could not form good paper, and they would damage

the tools in their strenuous efforts to form good paper. The ideal car for a new driver is a “beater.” Once acclimated to any vehicle at all, it becomes safer to advance to a better one.

There is a balance to strike between the quality of the tool and the skill of the papermaker. If the tool is not good, it limits the quality of the paper, though a skilled papermaker makes the best of it. The best tools do the best work in skilled hands. A virtuoso can make a factory violin sing, while no amount of effort by a beginner can do the same on a Stradivarius. Sound tools ensure that half of the hard work is done before the papermaker begins. And the tools that actually belong to us become the most precious: the owner of the tool often takes the best care of it. Students bang up the tools at hand because they did not have to build or buy them, nor do they have to repair or replace them.

Access to a range of tools teaches the differences between them and highlights the quality ones to which to aspire. After I had learned to make paper and practiced with all of the student tools available, I heard a rumor that a professional laid mould existed under lock and key. When the mould emerged, we were mesmerized by how gorgeous it was, with dark mahogany framing the shiny wire facing. This was a mould to fight over, and those of us who knew about it tried not to let the secret out. Instinctively, we knew to take much better care of it than the other tools. I did not know who made it, but I treasured the paper I made with it. (Over a decade later, while doing this research, I confirmed with the former studio manager that it was indeed a Timothy Moore mould.)

Halfway through my graduate study, the paper studio acquired a new seven-pound beater built by David Reina. We were all excited to be able to beat larger quantities of fiber, especially because at that time our program encouraged ambitious projects and installations. However, we could not use the machine for a year because it did not fit through the single door of the beater room. While the new construction and wiring were underway, I would occasionally peek through a locked set of doors at the end of the hallway that led to a freight elevator. I could see the machine and was frustrated that it was left to sit unused for so long. Fortunately, the beater-room renovation was complete in time for my thesis production, which required thirty pounds of fiber. The biggest learning curve on that beater involved remembering to close the lid all the way so the machine would start; serious safety measures were engineered by its maker to keep our bodies intact.

Many have written about papermaking tools and equipment, their specifications, what they do, how they work, variations, historical models, and how they have evolved. It has taken me years to appreciate the tools I learned with, the ones I have since encountered, and those I still aspire to own. In the process of learning papermaking and its history, the people who make it possible have become incredibly compelling to me. Why are toolmakers drawn to this work? How are they influenced by family, partners, friends, and teachers? How do they get along in a world that demands speed in delivery when a single job takes months? These questions got louder and louder after I met the last family making screens for hanji production in Korea in 2009. My initial concern was that this know-how might disappear, but that grew into a wider interest in the people who make our work as papermakers possible, to recognize their important contributions, and to thank them.



Fig. 1. Wood to be cut for woodpile at Moore's home in Concord, Michigan. September 2017.

THE MOULDMAKER: TIMOTHY MOORE

Toolmaking to me is a humble, social form of sculpture in which I play a limited part; tools, after all, have independent work lives. What they will be used to make and what processes they will be part of cannot be completely known by the person who makes them.

—Timothy Moore¹

In the Michigan countryside, immediately south of Route 94, are farms and the vestiges of the industrial core of America now known as the Rust Belt – defunct factories near the Kalamazoo River and a train line that runs only a fraction of the traffic it did in its heyday. The river forks into a north and south branch at Albion, and the village of Concord sits below the north branch, about seven miles away. The drive from Albion leads from a small college town through farmland and then woods. Only a set of mailboxes on the opposite side of the road mark the turnoff to a shared property. Fork left down the dirt road to be greeted by a clearing and an immaculate woodpile that faces a two-story building. A wood-shingled house lies further back and a garden surrounds it with enough space to sit and admire the tall spruce trees that hem the entire compound. Fig. 1.

1. Moore, Tim. "Constructing Western Molds." *Hand Papermaking* 2, no. 1 (Summer 1987): 20.

Timothy Moore built the house and studio, and regularly stocks the woodpile. Tall, lanky, and bespectacled, he lives in Concord with his wife, artist Pati Scobey, and their pets. Now mostly retired, he remains the finest mouldmaker in North America. Born in 1955 in Albion, he grew up in the town, where his late father was a mathematics professor. Albion had grown in the past through heavy industry, which at first thrived on water power and later supported the auto industry. Although large factories were slowly shutting down during Moore's childhood, the Malleable Iron foundry was still open, along with a steel-fabricating company and Corning Glass Works. The peak of Albion's economic prosperity was in the late 1950s and early 1960s, when all the stores on the main street were occupied, and most of the factories were owned by locals. Moore recalls his late mother's stories about how frequent the train traffic was through town; Albion is still a stop on the Amtrak passenger line, and the tracks cut right through today's Albion College campus.

The fourth of five children and the last of three sons, Moore hit the "sweet spot" in the birth order and was mostly left to his own devices.² His father, originally from Kansas, loved music and attended university on an oboe scholarship. While teaching at Albion, he played oboe in the college orchestra and sang in both college and church choirs. Skilled in stained glass, he also became an accomplished weaver. Interested in pattern rather than self-expression, he bought a loom from another faculty member, took a few classes, and subscribed to a magazine to learn. Meanwhile, Tim Moore's mother did hemstitching on his father's weavings, which included hand towels that were auctioned for charity. An English major in college, she was civic minded and directed her cooking, baking, sewing, and embroidery skills not only toward her household but also to community needs. She quilted for Project Linus, the AIDS quilt, and each of her grandchildren, all while raising a close-knit family of five children. Moore's parents and sisters are now deceased, and he shares his home property with one brother while their eldest brother lives down the hill.

Moore's father was handy around the house and did some woodworking, keeping a scroll saw in the basement of the house. Moore played around with the saw and was always making something: kites, wooden boats (some in bottles), wooden boxes, and dulcimers. He took watches and clocks apart to put back together again and loved anything mechanical. He made pen-and-ink drawings of castles and trees, always sketching things he planned to build, from clocks to fantastical tree houses. When he later went to art school, he enjoyed figure drawing. By his senior year of high school, he had most of the credits he needed to graduate, so he elected to take a vocational-technical course in house building. Every day for a half day, he took the bus to Battle Creek and worked with fellow students to build a house. The kids came from rural and blue-collar households, like some of his classmates back in Albion, though his experience growing up in a factory and college town meant that his community included factory owners, professionals, storekeepers, and college employees as well.

Unsure of what he wanted to do, Moore took his first year of university at Albion College, but it was not the right fit. He took a year off, worked at a factory, traveled,

2. Interview with Tim Moore, 12 September 2017.



Figs. 2a–b. Above: Posts built by Moore to replace older versions in Pullman, Illinois; his tools in foreground and the greasy wall from restaurant cooking in back. Right: New post and rail installed in Pullman. Photographs courtesy Timothy Moore, 1977.

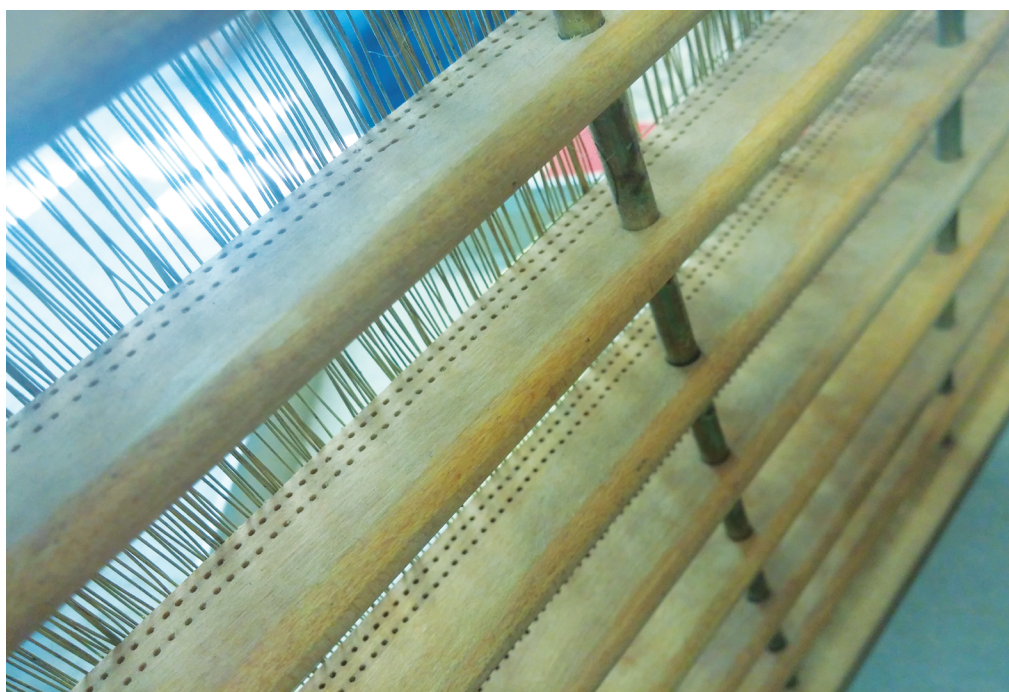


built furniture, and worked on a greenhouse for his eldest brother. This brother gave him a subscription to *Fine Woodworking* as a birthday gift. The magazine became an important resource, and he has kept every single issue since that first one. He transferred to the University of Kansas in Lawrence, where he met Scobey and studied art. His degree was in painting and sculpture, but once he finished his core requirements, his studies were self-directed and he focused on wooden sculptures. He had already started to buy woodworking tools in high school, so by the time he was an upperclassman, he owned a good set of tools and could settle into a studio space that had been newly rebuilt for the art department.

In 1977, during the summer break from his Kansas studies, a family friend, interested in historical restoration, hired Moore to work near Chicago on the old Hotel Florence in Pullman, George Pullman's factory town where the eponymous railroad cars were built. He spent eight weeks on the south side of Chicago, replicating old posts and staircase railings that had rotted away. His shop was in an abandoned Greek restaurant that still sported a wall of grease behind the counter. Figs. 2a–b. Across the street from the Hotel Florence,



Figs. 3a–b. Above: Top of the very first mould made by Moore. Note the lack of wire support underneath the facing. Below: Detail of the back. Moore and Scobey thought that each wire had to be sewn to the ribs. He drilled the holes and Scobey began to sew, but they abandoned the project fairly soon afterward because the task was entirely too daunting.



where he was staying, lived Gary Frost, who was teaching at the School of the Art Institute of Chicago. Frost was living in a house that was part of the Pullman planned town and invited Moore over for dinner. He was the first major book scholar Moore met, the first of many such friends.

Moore had met Scobey during his junior year in college, and she was ahead of him in her studies. They married as soon as he graduated, had two dogs, and felt ready to move. In Rochester, Minnesota, they found an old farmhouse to rent and lived there for a year and a half. Hired at minimum wage at a machine shop, he worked for eight months using lathes and milling machines, learning on the job. This provided valuable skills and experience but also convinced him that he did not want to be a machinist. He tried to get carpentry work while Scobey began graduate school for printmaking at the University of Wisconsin-Madison. They eventually moved to Madison in 1981, where they would live for six years. Scobey had begun studying with Walter Hamady, who was pivotal in introducing Moore to mouldmaking.

The first mould Moore attempted to build was for Scobey, based on two prints from the Diderot *Encyclopédie*, a French encyclopedia from the mid-eighteenth century, reproduced in Dard Hunter's *Papermaking: The History and Technique of an Ancient Craft* (Moore consulted the paperback version).³ Solely by looking at the diagrams, he tried to figure out how a mould was constructed, but never finished making it. He still has that first attempt, valiant in its effort but incorrect and totally unworkable. Figs. 3a–b. That exercise, however, prepared him to see the real thing when Hamady showed him his collection of moulds. As he inspected each mould, Moore had many moments of realizing how various parts were made. He took measurements, and poked around to understand their construction and logic so he could eventually replicate what he saw. Figs. 4a–c.

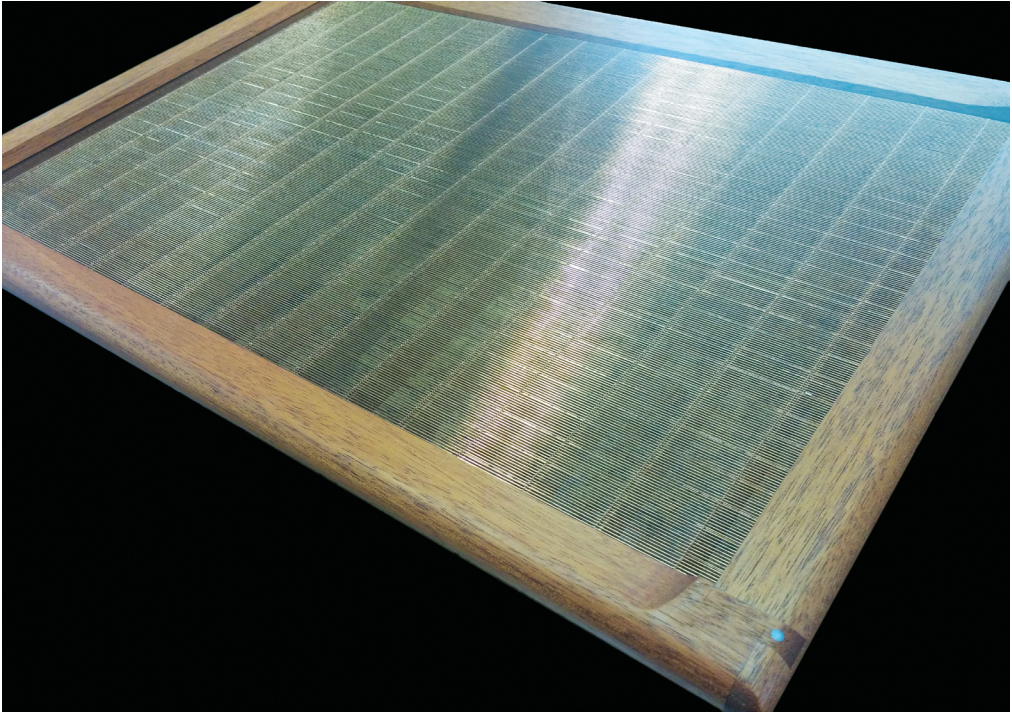
Hamady offered Moore his first challenge: take a two-on mould (a wide mould with a divided deckle that could create two sheets side by side) and turn it into two separate moulds for Hamady's students to use. This project taught him how moulds were made:

While I cut and trimmed the facings, removed a couple of ribs and fitted new ends I became familiar with the parts of a mold and with the way they fit together. As I worked I became more and more impressed with the skill and care with which the mold had been made and by the simplicity and elegance of its design.⁴

Moore thought he could make moulds if he tried hard enough but that no one would ever want to pay for the labor. Soon after, Kitty Kingston at University of Wisconsin-Stevens Point was starting a papermill in Madison and asked him to assemble a mould from a

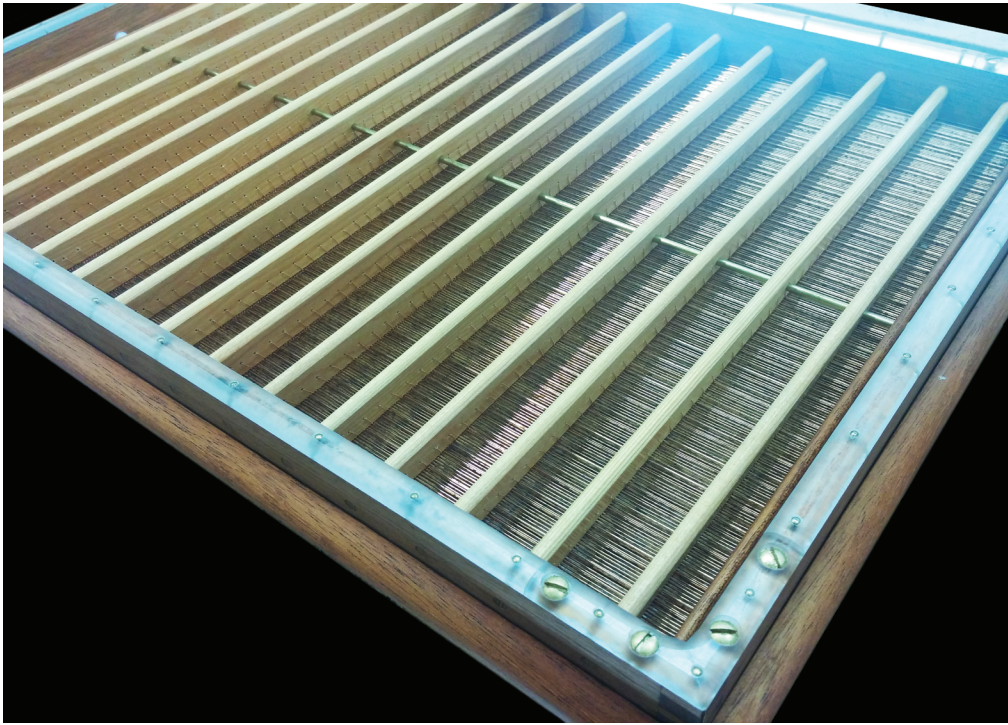
3. Hunter, Dard. *Papermaking: The History and Technique of an Ancient Craft*. New York: Dover Publ., 1974.

4. Moore, "Constructing Western Molds," 20. Note: Earlier in his career, Moore used the American spelling, "mold," but now defers to the British spelling, "mould."



Figs. 4a–c. Contemporary mould by Moore. Above: Top. Below: detail of facing. Overleaf: bottom with polycarbonate to reduce weight. All photographs taken September 2017.





Lee McDonald kit. Moore became obsessed with figuring out how to make moulds like those he had seen in Hamady's collection, from the proper weight of the wire mesh to how to use backing wires. When Kingston next asked him to build her one from scratch, he had to figure out how to make a working loom to weave facings, because he wanted to be able to offer custom variations rather than purchase prewoven screens. Fig. 5. This was the perfect kind of work for his temperament, and he would lay awake at night thinking about how to build what he needed, persevering through numerous failed attempts.

In Madison, Moore did odd jobs and carpentry, including work for a company that made insulated window coverings and house repairs for Hamady. Scobey's MFA program was in the vanguard of the burgeoning field of papermaking and book arts. Along with many others from around the country, Kathryn and Howard Clark of Twinrocker Handmade Paper traveled to Madison in 1983 to see the exhibit of creative bookbinding at the university museum, *Breaking the Bindings: American Book Art Now*. The Clarks invited Moore and Scobey to Brookston and ordered a few moulds right away. Moore also met like-minded colleagues, among them Lee McDonald, at the Friends of the Dard Hunter Paper Museum meetings in Appleton, Wisconsin, and received encouragement to develop his mouldmaking practice further. McDonald, who was already making moulds, inspired Moore with his example and provided advice. He and Scobey first met Timothy Barrett in Kalamazoo, Michigan, when they stopped to see him and talk shop during a road trip with their toddler



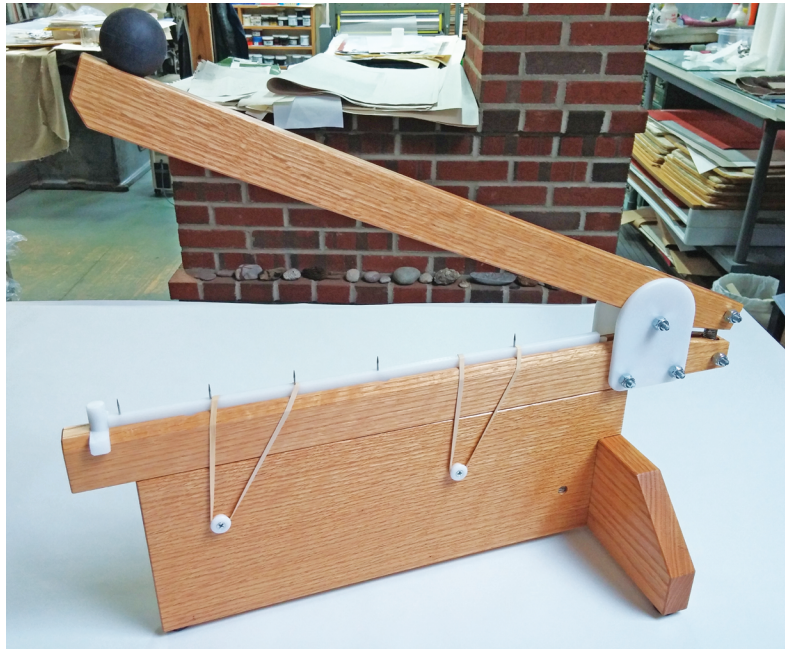
Fig. 5. Loom for weaving mould facings by Moore set up in Cleveland, Ohio, at Tom Balbo's private studio for teaching pre-conference workshops at the 2012 joint meeting of the Friends of Dard Hunter and the International Association of Hand Papermakers and Paper Artists (IAPMA).

son. Barrett ordered moulds for the University of Iowa soon after he began working there and still uses some of Moore's first ones. Soon more customers were added to a quickly growing list of real orders. In 1987, Moore and Scobey moved to their current property in Michigan and had their second child, a daughter, in 1989.

For years, the right work arrived at the right time. Moore could make moulds fairly quickly, with an average turnaround time of three months, and his customers were happy. He rarely heard from them again – presumably because they were satisfied – which was the downside of success: with no complaints, he was hesitant to make too many changes. One customer who sent a mould to him for repairs obviously worked in high-production mode, and the specific pattern of wear on the tool revealed why certain of its parts had evolved for production settings. Since retiring from production work, Moore has felt more freedom to experiment and continues to make changes, such as devising ways to avoid overbuilding by swapping heavy materials for lighter ones, like polycarbonate, and rethinking rib construction.⁵

5. Moore, Timothy. "Appendix C. Mould and Deckle Construction." In Barrett, Timothy. *European Hand Papermaking: Traditions, Tools, and Techniques*. Ann Arbor, Mich.: The Legacy Press, 254–290. This book not only includes the appendix but also links to a companion website that features, among many other resources, Moore's videos about mouldmaking.

Fig. 6. Moore's signature punch. This is his current version on the market, which is the fourth iteration of the tool. This particular tool comes in a box with supplies and extra parts. December 2017.



After the initial learning curve in mouldmaking, Hamady asked Moore to make a tool that could punch sewing holes in an entire signature at once for bookbinding. This led to the signature punch, the first of several book tools that Moore began to design and produce. Fig. 6. Fascinated by wooden screws and how to best make them, he developed a repair press that sits on legs, making it easier for a book to hang but remain supported. (Mindell Dubansky, head of the Sherman Fairchild Center for Book Conservation at the Metropolitan Museum of Art, says this feature is incredibly useful, though she remembers that it took a while for their orders to be filled.) Figs. 7–8. These two tools are Moore's most popular and still in production.⁶ Certain years would bring many orders for moulds, but one year yielded only one, which made Moore grateful for his book-tool business. Fig. 9. With both sets of tool production ongoing in his shop, he enjoyed figuring out how to make them and honing his skills on machines like the lathe, which he considers an instrument that challenges him to work intuitively, in motion, like making music. He felt lucky that the things that interested him served the needs of a specific niche. In the book-tool field, he received extensive advice from Tom Conroy in the San Francisco Bay Area. Much later, he was inspired by the wooden-screw work by Frank Weisner in Australia.

In 1993, at the Paper and Book Intensive (PBI) in Texas, Moore taught a mouldmaking class in which students worked together to produce three small moulds that were sold at

6. More about Moore's book tools can be found on his website: <<http://www.timothymooretools.com/>>; accessed 24 March 2019.



Fig. 7. Moore's repair press. This is the smaller version on shorter legs. A taller version accommodates wider books. December 2017.



Fig. 8. Moore's repair presses sit on a shelf with other tools in the conservation lab of the Watson Library of the Metropolitan Museum of Art. December 2017.



Fig. 9. Some of Moore's bookbinding tools, including a sewing frame and finishing press (left) and compact lying press with plow on top (right). December 2017.

the final auction. Figs. 10a–c. He precut all the wood, but students marked and cut joints, formed the ends on the ribs, and wove the laid facings on a miniature loom. Fig. 11. Several years later, PBI called again to ask him to teach in North Carolina at Penland School of Crafts. This time he decided to teach students to make wooden finishing presses for books, because good ones were hard to find. He recalls that he was working in his home shop when the PBI co-directors called to invite him. They talked about what he could teach, and after he hung up the phone, he went back to his shop, but the phone soon rang again. This time it was Tom Conroy, offering to send sketches, notes, and copies of his book-press research to make sure Moore got off to a good start by avoiding certain mistakes. Although the Penland shop where PBI was held in 1996 had power tools, Moore did not want to risk accidents, so he figured out a way for students to have to use only a drill press and lathe, along with hand tools. The instructor's biographical sketch for that course read, "Tim Moore has been self-employed since 1982, making paper molds and bookbinding tools. He especially enjoys devising methods to make unusual or hard-to-find tools. He lives and works at his home near Concord, Michigan."⁷

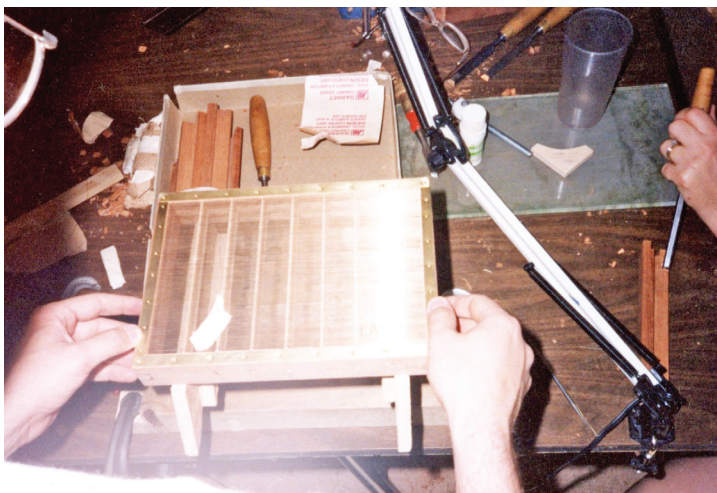
7. See: <<http://www.paperbookintensive.org/pbi96.html>>; accessed 8 December 2017.



Figs. 10a–c. Students at the 1993 Paper and Book Intensive (PBI) in Moore's mouldmaking course. All photographs courtesy Timothy Moore.



Moore is standing in back, facing away from the camera.



Described by those closest to him as self-effacing, Moore insists that there are interesting people out in the world, but he is not one of them. Sometimes he even backs away when too much attention turns to him and his accomplishments. It seems to be a personality trait but also an attitude that has developed through maturity. Any trace of young egotism has long passed, and he truly finds pleasure in figuring out how things work, by himself, at home. Once I brought two small jobs to him, and he completed the first one even before I left. The other, replacing support ribs for a Japanese sugeta, was finished deftly in less than a week. Working in wood is first nature to Moore. He possesses incredible observational skills, noticing details that would pass over most people's heads. I showed him a video of a Chinese man who made bamboo screens for papermaking. While we watched the process of drawing splints through a metal draw plate, I was looking at the shavings coming off of the bamboo. Moore instead asked why the man used pliers to knock the plate each time he began to pull a splint through an opening. This is the difference between a toolmaker and layperson.

Moore has always worked alone, but he is connected to a network of papermakers and toolmakers. He has been a member of the Friends of Dard Hunter (FDH; originally FDHPM) for decades and has a regular subscription to *Hand Papermaking*, to which he has contributed valuable articles on mouldmaking.⁸ In 2012, when FDH held its second joint meeting with the International Association of Hand Papermakers and Paper Artists (IAPMA) in Cleveland, he took his looms to Ohio to participate in pre-conference courses, teaching young students to weave laid facings. Ever fastidious, before the drive he took his loom apart and made careful notes to ensure that the loom would come back together smoothly once he arrived in Ohio and to make sure he did not forget any parts. He enjoyed being able to talk in person again with his tool colleagues, Lee McDonald and David Reina.



Fig. 11. Moore's loom for miniature mould facings. Set up at 2012 joint meeting of the FDH and IAPMA.

8. Aside from the 1987 article already cited here, the Summer 2012 issue of *Hand Papermaking* features a cover photograph of Moore's loom and an article to encourage new mouldmakers: Moore, Timothy. "Calling All Potential Mouldmakers." *Hand Papermaking* 27, no. 1 (Summer 2012): 21–25.

After twenty-five years of making tools, Moore retired from production work. A combination of family priorities, getting tired of the business end, and the stress of keeping up with so many orders caused him to close up shop. After getting a website, which exists to this day, though highly dated, he received so many orders that he could not keep up with the demand. It was no longer fulfilling because he disliked telling people they would have to wait three years for a mould (though I have met owners of his moulds who were happy to wait, and I have never seen a used one go up for sale). Now a grandfather, with less time and less energy to devote to the work, he hates the thought of not doing it at all. Although he has closed the business, he continues to make moulds and book tools. He likes to improve on these skills but is uninterested in being a manufacturer or in marketing himself. Instead, he wants to find interesting projects and people who know exactly what they are getting. On social media and in the real world, people rate his moulds as their favorite tools. The two massive 40 × 60 inch moulds he made years ago for Dieu Donné, based on a Howie Clark design, are still in heavy use, albeit after many repairs. The sewing alone took months, and they were so wide that he could barely reach around them to work. I imagine that only a very ambitious mouldmaker, with long arms, would be up to that task.

Moore's studio is neat and well organized. Storage is efficient and makes maximum use of available space with high shelves that keep things off the floor. As a woodworker whose material swells and contracts, he has tracked the relative humidity of his studio year-round on a handwritten chart posted in the shop. Files, boxes, and drawers are clearly labeled with tools and notes, and he keeps electronic records of his tools. Figs. 12–16. Because he can make so many different tools, sometimes he does not get to a particular one for a couple of years, so it is important to keep notes. Self-taught, he has amassed a huge store of knowledge through practice and research, though he admits he does things in “kind of odd ways” that have been built over time to develop a serious command of niche skills.

For years, Moore has wanted to share this know-how – “I have no secrets” – and would love to teach everything he knows, but he has not met the right person yet.⁹ Various people have come for short stints, and some have picked up skills at the loom, but no one has had long-term training.¹⁰ He wonders if he could even manage the teaching himself, because it would take a certain kind of student, and the wrong fit could be disastrous. Fig. 17. Over the years, people from around the world have been in touch, from an engineer in Russia who used a computer to produce plastic parts for a loom, to Serge Pirard in Belgium and Brian Queen in Canada. People keep him in the loop about others doing similar work, and he has been interested in seeing other hand-built looms. Queen, always excited about open-

9. Phone interview with Tim Moore, 28 February 2017.

10. A few years after his class in Cleveland in 2012, James Kleiner visited Moore's studio for more instruction, funded by the Minnesota Regional Arts Council. Moore loaned him his loom and has since built himself a new one (the usual complaint about the original loom was that it only worked well for tall people). Kleiner mentions this part of his skill set in his article “Old and New: Learning and Adapting Traditional Hand Papermaking.” *Hand Papermaking* 31, no. 1 (Summer 2016): 35.



Fig. 12. Moore's studio. September 2017.



Fig. 13. Moore's studio. October 2017.



Fig. 14. Spacers for Moore's loom. September 2017.



Fig. 15. Parts for new moulds. December 2017.



Fig. 16. While visiting the Kalamazoo Book Arts Center (KBAC), Moore inspects a mould he made in 1995 for the late Paul Robbert, an artist who was a founding member of the organization. The KBAC paper studio is dedicated to Robbert, a prolific papermaker and excellent tool builder himself, and the studio inherited most of his tools, materials, and equipment. Moore had not seen the mould since he shipped it, and it is still in excellent condition. October 2017.

source materials, suggested sharing more information about the looms because making the facings is the hardest part of mouldmaking. The two have collaborated on drawings that have been published.¹¹ Moore has made videos of some of his processes, filmed so that all the information will be accessible to many. Though he appreciates new efforts to use computer technology and 3-D printing to produce moulds, he leaves that to others, saying, “You don’t want to put too many things between your hands and your head.”¹²

11. Moore, “Appendix C. Mould and Deckle Construction.”

12. Interview with Tim Moore, 12 September 2017.



Fig. 17. In May 2017 at the University of Iowa, Gary Frost convened a toolmaker's guild meeting to mark an invitation for Moore to come and speak to the students at the Center for the Book. Moore and Scobey drove to Iowa with a huge array of his tools to present to the students, and then the students showed their own attempts and experiments with making various tools for bookbinding and papermaking. From left to right: Pati Scobey, Tim Barrett, Bill Voss, Gary Frost, Suzanne Glemot, Tim Moore, James Kleiner.

Although Moore said, "Papermakers are very social animals. Toolmakers not so much," he once referred to his tools as social sculpture.¹³ Through his tool-making work, he is connected to hundreds of papermakers around the world and enables them to make high-quality paper. Next to the house he built grows horsetail. While we were discussing its use in the past as a natural sandpaper for wood, with its abrasive silica content, he pulled a stalk away to show me. They strike me similarly: skinny, tall, and naturally gifted in service to improving and finessing work.

¹³. Phone interview with Tim Moore, 28 February 2017.

THE BEATER BUILDER: DAVID REINA

Now my idea of what should be in a home shop is skewed from the norm. My father is a sculptor and by the time I was a teen his studio had welders, both gas and electric, a table saw, and a drill press along with a huge amount of hand tools, clamps, and interesting materials. These days my shop contains lathes, milling machines, drill presses, thread tapping machines, welders, hand sanders, hand grinders, metal band saws, wooden band saws, a horizontal band saw, and stationary belt and disc sanders. The list could go on for several more lines.

—David Reina¹⁴

Born in an army hospital in New Jersey in 1953, after his father had been drafted, David Reina grew up on Long Island in New York. The family moved around a few times, and when he was six they relocated to a development that was still being built in Commack. The community was full of young families with children his age, and the kids had the run of the place while their parents were at work. They played a lot, making scooters and tree houses in the woods with whatever was available, like barrels of nails and building materials. With a lively social scene for children, reminiscent of *The Little Rascals*, it was a great environment to grow up in with his younger brother, who eventually became a painter. Over time, their artist parents wanted studio space, so they bought an old three-story wooden colonial in Lloyd Harbor within walking distance of the water. There was a concrete garage built for three cars, with an upper floor that became his father's studio. The property dated from the turn of the twentieth century, and the original owners had built pits to work on cars.

Reina's love for vehicles began in childhood and continues to this day. He was in the soap box derby three times in a row, though he found the competition anticlimactic because he would work so hard to build a car that was retired after one race. At eleven, he was allowed to buy his first car, a 1936 Oldsmobile coupe, but it was sold when he was in seventh grade because his grades went down. Toward the end of high school, someone gave him a car from which he removed the body so that he could build it a new wooden one. He spent late nights in the shop to make it look like an old "woodie car." Fig. 18. Growing up, he wanted to be a car designer for Detroit or an FBI agent, and still reads mysteries avidly. He has never stopped working on cars, and they are a fixed presence in his studio and at home. Fig. 19.

Both of Reina's parents taught art, his mother in elementary school and his father in middle school, high school, and college. His mother was a talented artist in regular shows on Long Island. When macramé was a huge trend, she became quite adept and had a piece featured in the *New York Times*. His father was a sculptor who worked in metal, but he also sculpted in clay and had several commissions for schools that were being built in the area. Some were up to twenty feet tall, protruding from buildings or attached to them. "He

14. Reina, Dave. "A Home-Built, Hardware-Store Beater." *Hand Papermaking* 27, no. 1 (Summer 2012): 3.



Fig. 18. Reina in his rebuilt, wood-bodied car, a painting by his brother, Doug Reina.



Fig. 19. View from the street into Reina's studio when garage doors are open. May 2017.

could do everything; I was his assistant. I give a lot of credit to my dad for letting me use his studio.”¹⁵ Incredibly patient and very practical, his father let him use almost all the shop tools and experiment with materials while he figured out how to solve things. Only the brand new TIG welder was off limits. Reina did not inherit the same patience and generosity, however, and confesses, “I hate when other people use my tools,” which is a sentiment I believe most people share.¹⁶ No one was as passionate about being in the shop as David was, and it remains the place where he spends most of his time. Rather than growing up going to ballgames with his father, he went regularly to exhibits of his parents’ friends who were actively making art.

In high school art and industrial-art classes, Reina always got straight As without much effort, unlike in his other courses. One of his teachers at Cold Spring Harbor High School, a fine artist and clothing designer, was the late Christine Schmidt. She owned a Charles Brand etching press and convinced the public school to buy one for the classroom. He enjoyed learning etching but beyond that he liked the press itself. The “simple honesty of construction” has stayed with him to this day.¹⁷ When Schmidt moved to Bar Harbor, he helped her disassemble and move the press. Interested in becoming a painter, he was accepted by Pratt Institute, School of Visual Arts (SVA), State University of New York–New Paltz, and Syracuse University. After bombing an interview for one of ten scholarship slots at SVA by not preparing at all because he was unaware that he should have, he chose New Paltz, the best art program in the SUNY system at the time. Aside from his painting courses, he took printmaking and began to appreciate good-quality rag papers.

Reina studied abroad in Urbino, Italy, at an art program that focused on etching. Before he left for Italy, he had met Anton Krajnc, an Austrian teacher and artist. Krajnc happened to have an etching press in Urbino in pieces in a garage, and he welcomed Reina to put it together to use when he arrived in Italy. After being invited to a social gathering at another classmate’s home, he noticed a low bench with handsome cast-iron legs. Upon inquiring where the legs came from, his host said that he had found them in the garage. So much for the press! Because it had been converted into someone else’s furniture, Reina never got a chance to assemble it for printing.

After graduation, Reina returned to Long Island and tried to make a living by illustrating children’s books and making wooden toys. This did not pay the bills, so during the week he worked for a company that fabricated tow trucks, wiring truck lights. On weekends, he was a guard at the Museum of Contemporary Crafts (now the Museum of Arts and Design). It was the most boring job ever, but he was able to see beautiful hand-crafted objects on a regular basis.

While living with his parents in Long Island and working two jobs, Reina ran into Krajnc again, who was studying with Douglass Howell and renting half of Howell’s carriage house in Lattingtown, New York. Reina was given a tour of Howell’s facility and was fascinated by

15. Interview with David Reina, 16 March 2017.

16. Interview with David Reina, 16 March 2017.

17. Interview with David Reina, 16 March 2017.

his three beaters in copper, plexiglass, and stainless steel (the latter eventually ended up with Eugenie Barron, and Reina rebuilt the machine for her years later). Rather than teaching papermaking to Krajnc, Howell had him do unrelated things, such as run the table saw. When Krajnc invited Reina over for dinner one night and complained about his situation, Reina suggested he make a beater himself. They calculated a budget of seven hundred dollars, a large amount in 1972 (and one they totally exceeded), and a month to build it. After the support frame was welded, Reina went to a plastics supplier to buy quarter-inch plastic, which had a hard surface to which glue cannot attach. To form curves, he cut the plexiglass, put it in his mother's oven to soften, and draped it over cardboard barrels. He used his father's shop for much of the beater building, which frustrated his dad because all of his taps were broken in the process. While building the beater, Reina asked Howell lots of questions, which the latter was alternately okay and not okay with, saying, "This is how I make my living!"¹⁸ The new beater had no gear train (he later added one) and the roll adjustment was achieved with knobs like on an etching press.¹⁹ It beat very well, however, and Krajnc started to have many students of his own, such as Coco Gordon, who lived next door to Howell. After Reina moved to Queens, to stay with his grandmother, and started commuting to a new job in New Jersey, he lost touch with Krajnc again.

After working two jobs for a year, Reina met someone in the toy industry and visited a shop that produced prototypes. He liked inventing toys because they combined sculpture and engineering. Advised to make his own toy to bring to interviews, he constructed a whale with a paddle-wheel tail but painted it an automotive maroon-bronze color. They insisted he repaint it because it was not an appropriate toy color. Then he was given a copy of the *Toy Directory*, which listed names of companies and descriptions of the toys they made. New York City was still a major place for buyers to order toys, and each February brought a huge toy fair to town. While living in Queens, Reina went to Manhattan with the directory and a bagful of dimes, and sat in the Donnell Library (now the Fifty-Third Street Library) to make phone calls on a pay phone to companies where he wanted to work. He landed ten interviews after making eighty phone calls, got two job offers, and accepted a job in Short Hills, New Jersey.

Because of Krajnc's beater, Reina's name was included in a book about papermaking and beaters, and inquiry letters started to arrive to his parents' house – the address listed in the back of the book. Eventually, he decided to try to build another beater; his first customer was a woman in San Francisco. For his toy-company job, he had moved to Milburn, New Jersey, and lived in a tiny house on Mechanic Street. Up the street lived two brothers-in-law, both machinists. One of them, Bill Lapointe, liked to talk and bounce ideas back and forth. Together they devised a stand welded from steel tubes and bar stock, and Lapointe introduced Reina to a company that could make a beater tub in stainless steel, different from

18. Reina's paraphrase from 16 March 2017 interview.

19. For a first-person account, see McDonald, Lee S., ed. *Beater Builders of North America: A Catalog of Handbuilt Beatens, 1946–1989*. Buffalo: The Friends of the Dard Hunter Paper Museum, 1990, 21–23.

his first plexiglass design. Both machinists helped to make parts for the beater. Reina made all the mistakes that new beater builders make, including putting the bearings up against the tub where the water can get in too easily. He did not turn a profit for several years, and his enterprise was subsidized by his main job building toy prototypes. Over time, he raised the beater price to reflect his costs while making improvements on his design. Eventually, this evolved into a completely stainless-steel chassis and tub. All the work happened in his basement shop, including wiring, testing, and finishing the machines. Then he would carry the finished beater up to the driveway to crate it, when invariably it would begin to rain.

Reina's full-time toy job was pleasant and inspiring. He enjoyed going to work every day because it was the perfect job for a builder. The shop employed three model makers, and each worked on one prototype at a time, allowing for intense concentration and brain stretching. They had a lot of autonomy, working from an artist's sketch and sorting out all the dimensions as they built prototypes from three-quarter-view drawings. It was a comfortable job with a full salary, a health plan, and other benefits, and, thankfully, his boss kept him isolated from other problems in the business. He missed this setting in later years when he moved to a larger company where he had to juggle twenty things at once. He worked at the first toy company for eight years, got married, had two kids, and bought a bigger house.

When the first job came to an end, Reina went to work at a prototype shop that not only made toys, but also Regina vacuum cleaners, Revlon perfume-bottle prototypes, and so on. He was required to work to a high level of precision and had a patient foreman who helped him get up to speed. At his first toy job, he had worked to his chosen dimensions, but here he had to learn to work to exact measurements, down to a few thousandths of an inch. This shop did not make many toys, which he missed, so he took a job offer at Buddy L Toy Co. It started with similar prototyping work but became more management heavy, and eventually he became the director of R&D. Instead of prototyping, he would travel to Hong Kong to meet with model shops. The business changed after it was bought by a Canadian company and went public; the corporate profit-driven mentality took the fun out of his work.

By then, personal issues had led to a divorce. In time, Reina remarried and moved back to New York. He and his wife, Donna Koretsky, proprietor of Carriage House Paper, bought the building in Brooklyn where they now reside. Both businesses ran out of the building, and they applied under a caretaker's clause for a certain amount of space to live legally within a business. At first, he built toy prototypes and beaters in that building, but, with two new children, they were soon running out of space. Also, beater-building work that involves metal is extremely dirty, so they looked for a separate industrial building. They settled on a 1890s brick building by the water in Williamsburg, which took two years to renovate because it had nothing inside except pigeons and a disused elevator. Outside, prostitutes stood on every corner, and the streets were full of crack vials and occasionally bullet shells. Now it houses Reina's shop and Carriage House Paper, with the upper floors used as residential rentals, and the neighborhood has gentrified considerably. Fig. 20.

Reina had built up his beater business to the point that he was making them and toys at a fifty-fifty ratio. Deadlines for both were incredibly stressful, and it was hard to do both



Fig. 20. Front door to Kent Avenue property. Once a gritty, busy truck route, it has been swept up into the gentrification of Williamsburg, Brooklyn, and beyond. May 2017.



Fig. 21. Reina's shop with vacuum table in progress in foreground. May 2017.



Fig. 22. Papermaking studio setup at Trinity University by professor Jon Lee. Reina hydraulic press and couching table in back. Reina paints his equipment with German roller brushes. February 2012.

well, so he finally shifted to making beaters almost exclusively. Koretsky encouraged him to design and build a dry box (also called a stack dryer), vacuum table, and hydraulic press.²⁰ Fig. 21. He is particularly proud of his press design, which includes a matching couching table on casters that locks onto the press and then slides the top tray of the table with a fresh post of paper into the press: no heavy lifting required and no risk of dropping the post on its way to the press. Fig. 22. (This was the first press I learned on, and it was hard to go from the best possible piece of equipment to sometimes simply standing on boards to apply pressure). He sells more beaters than his other equipment and has had repeat buyers for beaters. When we spoke in 2017, he had just made a ten-pound beater for an artist in Qatar who had previously purchased his two-pound and seven-pound models. Seven of his beaters have different homes in Australia, and many others dot the globe, including in China, Germany, Italy, Norway, and Scotland. Fig. 23.

Reina is still invested in the toy industry and has taught prototype-making in the BFA toy design program at the Fashion Institute of Technology for almost thirty years. One of

20. See more information about Reina's equipment: <<http://www.davidreinadesigns.com>>; accessed 24 March 2019.



Fig. 23. Reina two-pound beater (at left) and two ten-pound beaters (at right) at Dieu Donné's former location in Manhattan, New York. All three beaters were moved to the new location in Brooklyn. Photograph courtesy Tatiana Ginsberg. August 2016.

only two such programs in the nation, the program is small, with about fifteen students and a 90 percent job-placement rate. He enjoys teaching and has students from all over the world.

One of Reina's frustrations is the misconception that he earns a huge return on his machines. His business has a low profit margin, and his success has come from keeping overhead low, by either working in his living space or having tenants carry the cost of the building. What has stayed consistent throughout the years is the fact that his beaters cost the same as a decent used car. When he started out, a good car could be had for two thousand dollars. Now the figure has passed ten thousand. Currently he is working on building a lower-priced beater by replacing some of the expensive machining work on the roll with welding and other design changes. He admires Mark Lander for his brilliant idea of a vinyl tub but does not plan on replicating it. Orders have grown gradually and plateau and surge at certain times, often related to school equipment budgets; many institutions order his beaters because they are so straightforward and easy to use by students, with thoughtful safety features. Having been a young artist and builder on a budget, he understands the frustration of people who want his beaters but cannot afford them, but he also knows that his prices are fair for the work that goes into his machines.

In Reina's shop, he employs several part-time, long-term workers. Aware of what skills each person brings, whether it be welding, crating, or meticulous solitary work, he tasks them accordingly with specific jobs. All of his employees have come through recommendations; he



Fig. 2.4. Reina two-pound beater with new counter mechanism. May 2017.

has never placed an ad. He has met many people interested in learning or those who have come through for internships, but he does not want to train someone for two years only to see them leave. If he were ever to find the right person to take over the business, which he would like to last beyond his lifetime, he wonders how he would handle the transfer of knowledge. It would take a special person to be qualified for this work, which requires both inherent and accumulated knowledge, artistic sensibilities, and the understanding of fabrication, welding, machining, wiring, material strengths and capabilities, and so on.

Reina still draws and feels his creative side is satisfied, though he has a few inventions left to manifest. He enjoys making equipment for artists and knowing that they are using his machines. He sees this as his contribution to the art world. His goal is for each machine to be honed to the point where its design does not need to be changed. His manufacturing process has improved, and things that he used to job out, like making beater rolls, he now makes in-house. Finding the right subcontractors takes a lot of work and time, and the scale of his production is small compared to jobs that many machine shops take, which makes it hard to keep prices down because there is no volume discount. Then there are factors out of his control: the company that made the counter he used on his beaters was bought out and stopped making that model. His hunt for a replacement fortunately led to a German company, which required that he design a new method of driving the counter. Fig. 2.4.

The best time to find Reina in his shop is late at night, when the phone stops ringing. This is when he can concentrate. In nice weather, he opens his garage door, which tempts visitors from the street, mostly friends and neighbors who like to stop by during the day. He indulges in this socializing because otherwise he would see few people. Although he works primarily on his own, he has benefited from advice from colleagues like Howie Clark, who helped Tim Barrett with a washer unit on a beater. Barrett then encouraged Reina to build and offer a washer option on his beaters, and in 2014 he guided Reina on his first *naginata* project.²¹ Figs. 25–31.

Customer feedback is always considered and has helped to improve his designs. He has learned a great deal through his experiments and from colleagues like Barrett, Clark, Howell, and Helmut Becker. The process of repairing beaters built by other people has also been highly instructive. In turn, he is always amenable to sharing his knowledge: “If you can come to me, I will sit with you and help you.”²² People who call get a lot of advice, and he will correspond, send pictures, and help as he can. I worked with him on the *naginata* commission, a bedplate replacement for a Valley beater, and counter replacement on one of his ten-pound beaters, and have found him to be generous and thoughtful, with high standards of workmanship.

Some people ask why Reina does not patent his designs. His take is that a Hollander beater is an old design from the seventeenth century and not much has changed. There is no need to sell plans for a beater, because the machine has been around for hundreds of years and many drawings already exist. For his first beater, he went to the library and looked at pictures in Dard Hunter's books. Subtle details could be written down, but he fears that they would turn into an interminable volume. He feels a kinship to beater builders like the late Jim Yarnell, even though every builder approaches the work from a different background. Reina characterizes himself as “a very stubborn builder,” and the experience of the early Charles Brand press that he encountered in his teens still remains in his head.²³ When he rented a space in Brooklyn before he moved into his current home, the building shook because it was next door to a company that ground huge equipment, including those very presses. The honesty he saw in that press has guided him throughout his career, as he has created a new playing field for generations of papermakers with stable, trustworthy tools.

21. For more information about Barrett's first *naginata*, see Barrett, Timothy. “Optimum Fiber Separation for Nagashizuki Papermaking.” *Hand Papermaking* 6, no. 2 (Winter 1991): 12–14. For more information about Reina's first *naginata*, see Lee, Aimee. “A New *Naginata*, in Cleveland.” “Paper Slurry” blog, 9 September 2014: <<http://paperslurry.com/2014/09/09/a-new-naginata-beater-in-cleveland/>>; accessed 24 March 2019.

22. Interview with David Reina, 16 March 2017.

23. Interview with David Reina, 16 March 2017.

Fig. 25. Reina two-pound beater with washer at Trinity University; papermaking studio set up by professor Jon Lee. February 2012.



Fig. 26. Reina shows his newest two-pound beater with washer prior to shipping to a former toy-design student, who walked by with his friends, hoping that Reina's garage door would be open. May 2017.



Fig. 27a. One of two hydraulic presses with couching table by Reina at Longwood University. Photograph courtesy Kerri Cushman.



Fig. 27b. The second hydraulic press and two dry boxes by Reina at Longwood University. Photograph courtesy Kerri Cushman.

Fig. 28. Front of new dry box with blotters and cardboard wrapped for shipment. May 2017.



Fig. 29. Anton Krajnc with his beater, Reina's first. Photograph courtesy Anton Krajnc.





Fig. 30a. Vacuum table by Reina at Longwood University, artwork in progress by Ben Durham.

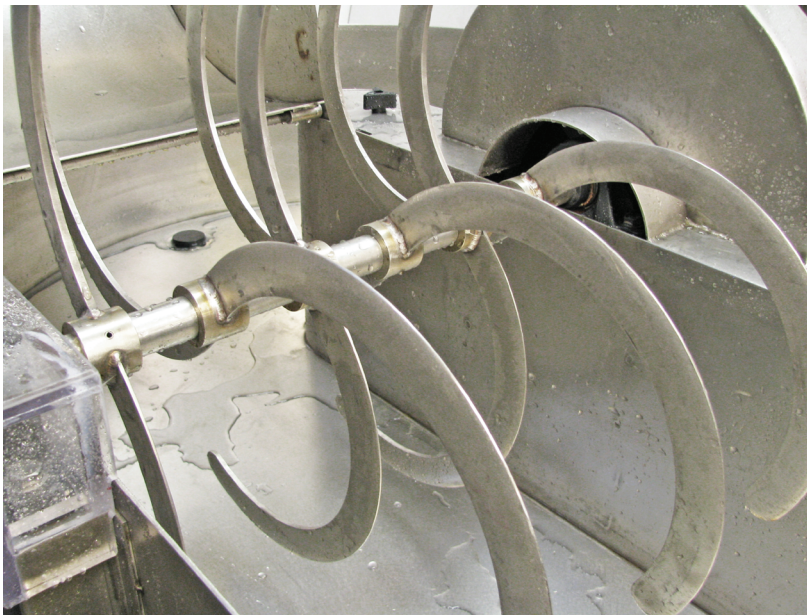


Fig. 30b. Artist Ben Durham using the vacuum table. Notice beaters by Reina as well. Photographs courtesy Kerri Cushman.



Fig. 31a. Lee fills naginata with water at the Morgan Conservatory in Cleveland; note similarities in design to Reina's Hollander beaters. August 2014.

Fig. 31b. Detail of water-jet-cut blades of naginata. July 2014.



This is Part I in a series of interviews with toolmakers for papermaking around the world. I wanted to begin with these two, who are at the top of the field. Aside from being extremely skilled in their respective trades, they are friendly, generous people. Both in their early sixties, Moore and Reina impressed me with their astounding recall and funny details. They coexist peacefully with cats and have raised families and created businesses in partnership with dedicated spouses in similar fields. Both toolmakers keep a wealth of reference material at their fingertips and are content to relax over a beer, cheese, and cured meat. I am grateful to them for opening their homes and shops to me, and retelling their stories, and to their families for putting up with the endless tinkering that makes our work as papermakers joyous.

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