

## Ingenious Mechanicks

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Early Workbenches & Workholding



by Christopher Schwarz





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*For Suzanne, who made sure this book was good* 



## Introduction

The alternative title to this book might have been: "The Book of Workbench Questions." While I have spent many years in-

vestigating early workbenches and workholding, I have only scratched the surface of how they were used. This is evident every time I sit to work at them.

Today, I braced an armchair against my low bench to plane flush the proud tenons on its arms, and it was such an easy and natural operation I was shocked I'd never thought to do that before. Last weekend, my friend Will Myers sat on the work as he traversed a board with a handplane, jamming it against stops in the end of the bench. That same day, Megan Fitzpatrick showed me how she used her leg as a vise when planing edges at my low bench from Herculaneum.

These little discoveries happen almost every day. And so, I am a bit embarrassed to present this book to you more as a kit or a blueprint for something that isn't fully understood.

While I am certain that I understand the different forms of early workbenches and the common workholding contrivances available for them, what remains undiscovered are all the ways they can be used to build furniture.

We saw, plane and chop for the most part. So for non-woodworkers, it's easy to simplify what we do. But how each workpiece is immobilized – regardless of its size – so that we can work on it without it slipping is far from simple. It's the heart of what we do.

Every piece of work, from a chair's arm to a carved rosette, offers a unique challenge to make it sit still. Many times, the answer is not in brute clamping force but in something far more delicate, such as the order of operations when you work.

Case-in-point: chair seats. Recently I demonstrated to some woodworkers how I work chair seats on a low bench, and I became frustrated because nothing was working. Every trick made the seat slide from my grasp like a wet watermelon seed.

I finally realized why I was struggling. I had planed the bevel on the underside of the seat before working the face of the seat. That bevel on the underside made the chair impossible to immobilize. So, note to self: Work the face first, then shape the undersides of your chair seats. Even after years of working with these benches, I sometimes feel like every day is my first day with them.

Are you tempted to close this book right now? I don't blame you.

If you are brave enough to plow forward and perhaps even build one of the workbenches in this book, let me give you some assurances and a warning.

The assurance: These benches work. They have been used to make all manner of complex wooden objects for more than 2,000 years. These benches are not an evolutionary dead end. They are not obsolete.

The warning: This book does not have all the answers. It is more of a series of questions, starting with: If we build these benches, how shall we use them?

It is my fondest hope that we can answer that question together through trial and error. And someday this book will lead to another book. Perhaps I'll be alive to write it. Or maybe your children will. But the only way we'll ever create answers is through work. Lots of head-scratching-what-if-I-tried-thishold-my-beer work.

So, let's get to work.

Christopher Schwarz Covington, Kentucky January 2018



**Figure 1.1.** The beginning. In the House of the Vetti, this dining room fresco is perhaps the earliest depiction of a workbench in the West. *PHOTO BY NN* 

# I Why Early Workbenches?

The journey to the summit of Mount Vesuvius has all the romance of visiting an unlicensed reptile farm. It begins in Ercolano, Italy, a touristy village in the shadow of the volcano and home to Herculaneum, one of the towns buried by Vesuvius's eruption in 79 C.E.

As Narayan Nayar (the photographer for the journey) and I stepped off the train from Naples we were assaulted by young, attractive Italians. Their job: Bait tourists to nearby restaurants. We glanced around and saw only one escape route from the train station's cul-de sac. So, we plowed through the crowd of eager human fishing lures.

We emerged from the other side a bit relieved. Then we realized we'd scurried past the bus company that was supposed to drive us up the volcano. We turned around and dove back into the swarm of too-perky people in order to catch our bus.

The twisty-turny bus ride ended 660 feet below the volcano's summit, and we then climbed a steep trail to the volcano's rim. The top resembles a gravel pit where one of Frank Herbert's worms might emerge. There's no deep hole for tossing human sacrifices – throw a virgin into Vesuvius and she's only going to get skinned knees and a



**Figure 1.2.** Where are the virgins? The cone of Vesuvius is not a fiery hole leading into the bowels of the earth. It looks like a gravel quarry where you might buy stone for your garden. *PHOTO BY NN* 

sunburn. I looked around the volcano and promptly excused the early settlers of the area for building their homes at the base of Vesuvius. The only evidence you're on a volcano (besides the little gift shops) is the occasional tiny plume of gas and the odd rocks below your feet.

I picked up a few rocks. For rocks, they were young – likely the result of the 1944 eruption, which destroyed several villages. I looked out from our 4,200-foot perch at the buildings in every direction below, which are built on top of villages that were covered in ash from earlier eruptions. It's a grim scene if you think about it too much - 600,000 people now live in the socalled "red zone" for a future eruption.

And yet, as I fondled the rocks in my hand I felt only gratitude for this deadly, fire-breathing mountain.

### The Earliest Workbenches

The recorded history of woodworking begins with the Egyptians. But the recorded history of workbenches begins (for now) with Vesuvius. Its massive eruption in 79 C.E. buried Pompeii, Herculaneum and other sites, preserving frescoes, buildings, pottery, human remains and even wooden furniture.



**Figure 1.3.** The red zone. Though Vesuvius hasn't erupted in decades, it is considered one of the world's most dangerous volcanos with 600,000 people at risk below it. *PHOTO BY NN* 

At Pompeii, the ash blanketed a fresco showing a low, four-legged workbench being used for mortising by a man in Greek attire. At nearby Herculaneum, the eruption preserved a fresco showing "erotes" – what we might call "buck nekkid cupids" – sawing a board at an eight-legged low workbench. It features a holdfast and other holdfast holes. This fresco has since been destroyed, but we have engravings that were made soon after its discovery (more on both the frescoes' stories is ahead). These two images are the earliest representations of workbenches of which I'm aware. And they launched my interest in exploring knee-high workbenches and how to use them to build furniture, boats, storage containers and wagon wheels.

The conventional wisdom is that these low benches were used in former times for simple work and were replaced by superior modern benches, which are thigh-high or taller. But the more I studied low benches, the more I found that they never disappeared. They are still in use. Additionally, these low benches can be used for complex work, including steam bending compound shapes and lutherie.

The low bench is more than a thick plank of wood with legs. It's also a collection of simple jigs and appliances that allow you to do remarkable work while sitting comfortably on an easyto-build platform. For centuries, these simple jigs remained hidden in plain sight in paintings and drawings in



museums. And their appliances have been proven to work, both at my low benches and by the modern craftsmen who still use them.

But why bother with this musty old crap? Modern woodworkers are blessed with a wide array of vises, dogs, clamps and other devices that can immobilize a piece of wood so you can work on its faces, edges and ends.

Well, at times I think we tend to make our workholding far more complex than it has to be. And that can affect your approach to the things you build. While your brain might see the logic of a screw-driven tail vise with a series of movable metal dogs, the ingenious early craftsman might find this same vise slow, fragile, fussy to maintain and cumbersome in use.

I empathize with the early woodworker. My brain is wired to look for a simpler solution to a problem instead of creating complexity.

Example: Earlier this year, I spent a couple hours in the dentist's chair and was force-fed several episodes of a home-improvement show focused on carving out storage from oddball places in a home. Some of the examples I remember over the whirring of the dental Dremel include: • Hinge your steps to create trap doors on the landings of your stairs to make small bins in the wasted space between your stringers.

• Find stud walls that are chases for utilities and turn them into built-in chests of drawers.

• In attic spaces, create sliding racks on the interior of a high-pitched roof. You slide giant plastic bins into the racks – it's a bit like a top-hanging drawer.

Through the entire program I wanted to puke (that was mostly because I have a sensitive gag reflex). But it was also because these "storage solution"



**Figure 1.4.** Ruined. Even with thousands of tourists around you, Pompeii is so sprawling that it seems deserted. *PHOTO BY NN* 



**Figure 1.5.** Teach a Roman to shave. It is a short intellectual leap from the low workbench to other "sit and work" appliances, such as the shavehorse.

programs neglect to mention the easiest way to control clutter:

Get rid of your excess crap.

No one should have so much stuff that they have to slave excessively to make a place to stow it. In the same way, no workbench needs vises on all four corners (I've built these for students and customers) to build fine furniture. You just don't.

With this book, I hope to expose you to early and simple ways of holding your work. While many of these devices were used on low workbenches, most of them work on high workbenches as well. I use both sorts of benches – high and low – in my work for building all manner of things, from stud walls to Welsh stick chairs, dovetailed chests to nailed-together coffins. The workholding on these benches is truly ingenious and effective. Things change when you sit down to work. And I think you'll be surprised what you can do on your bum: planing, chiseling, shaving and even dovetailing.

The low bench form might not be for everyone. But it might be right for you and you might not know it. Woodworkers with limited mobility use low benches because they can sit and work. Apartment woodworkers use low benches because they take up little space and do double-duty as seating or a coffee table. Curious woodworkers use them because – dammit – they are an interesting form to build and use. Many chairmakers already use a low bench (but they call it a shavehorse), as do many other specialty trades, includ-



Figure 1.6. Graven image. This copperplate engraving was made by Italian artists shortly after the Herculaneum fresco was discovered. Sadly, the original has deteriorated.

ing coopers and basketmakers. Oh, and a low bench is the best sawbench ever made – promise.

One more plug for these early benches: Using their lessons, you can make almost any surface into a worksurface. A couple drywall screws can turn a picnic table into an Englishstyle workbench. A missing brick in a wall (and a pine wedge) can become a face vise. A shavehorse can be cobbled together with a rock and a scrap of wood strapped to your gut.

Even if you never build a low workbench and reject its appliances as "not whiz-bang-y" enough for your engineering mindset, you might enjoy the journey of discovery required to write this book. It involved trips to exotic Italy, Germany and Indianapolis. (And understanding the low bench might connect your work to Chinese benches.) In the process, we rescued oak slabs from a pallet factory. We flushed \$1,000 down a metaphorical toilet to learn about the construction of the first modern workbench in 1505. We ate a ton of Neapolitan pizza.

Workbenches are at the heart of everything we do. So, let's take a brief look at the history of Western workbenches and consider why it's even worth looking at ancient benches.

### Meet the 3 Workbenches

For this book, I built three reproduction workbenches, and I refer to them over and over by the place names where each was discovered or the person who drew them. Here's a brief introduction to each one:

### Herculaneum Bench

The Herculaneum bench is an eightlegged low workbench I built from the earliest known depiction of a bench – a fresco from 79 C.E. Its workholding is decidedly simple – just holes, a holdfast and pegs. You'll also notice that I added a double-screw vise to one edge to the bench in the photo. This isn't original to the Herculaneum bench, but it allowed me to experiment with this more modern workholding appliance.



**Figure 1.7.** Toe hold. Almost everyone who uses the Herculaneum bench ends up wrapping their feet around the legs, or pushing against them while working. *PHOTO BY NN* 



**Figure 1.8.** Spider bench. This bench, shown in a fresco at Herculaneum in Italy, is perhaps the earliest representation of a workbench in the Western world. Why eight legs? I had to build it to find out.





**Figures 1.8 & 1.9.** Well made. This Roman bench is a copy of the oldest surviving bench I know of – a circa 187 C.E. bench that was pulled from a Roman well in Saalburg, Germany (at top). The dovetail-shaped notches on the long edge were the biggest mystery.

### Saalburg Bench

The Saalburg bench is the oldest surviving bench I know of – approximately 187 C.E. Again, the workholding is dead simple – a planing stop and two unusual side stops that we'll discuss later. I also built a variety of workbench appliances that attach to the Saalburg bench but aren't original to it. So, you'll see this basic bench crop up over and over.



**Figure 1.10.** Stuck. The planing stop is the heart of the Saalburg workbench. This pointed reproduction was made by blacksmith Peter Ross. *PHOTO BY NN* 



**Figure 1.11.** German ingenuity. Martin Löffelholz drew two workbenches in a codex dated 1505. Equipped with both a face vise and a tail vise, this appears to be the first modern workbench. The unusual tail vise was the biggest question mark. How well would it work?

### Löffelholz Workbench

The Löffelholz workbench (which I also call the "Holy Roman Workbench") is from a 1505 illustration in a German codex and is likely the first "modern" workbench in the historical record. It has both a face vise and a tail vise, but many of its characteristics are typical of a bench trapped somewhere between Roman workbenches and modern workbenches.





**Figure 1.13.** The first? Löffelholz's tail vise is surprisingly effective in use. But, like all tail vises, it is an involved process to install.

**Figure 1.12.** Novel notches. Many early workbenches feature simple notches in the benchtop, including one of the benches drawn by Löffelholz. Add a softwood wedge and you have an effective face vise. *PHOTO BY NN*