

TM Technologies

Tools & Methods for Better Metalworking



Hands-on Metalworking Training
2016 Class Schedule

Are you interested in learning metalworking or improving your fabrication or welding skills? Would you like hands-on, individualized training from an experienced instructor?



We have workshops that can't be beat!

Our programs give you the opportunity to learn metalworking from a seasoned professional with 40 years of metalworking experience and teaching under his belt. There aren't many metalworking problems he hasn't tackled, or questions he hasn't helped students with over the years. Most programs are held at Kent White's production metal shop outside Nevada City, California – please check class listings for locations.

Kent also presents customized off-site workshops and training programs for fabrication shops, aircraft and aviation companies, vocational and educational programs, small businesses, large corporations, and trade shows (see more details on next to last page). Please contact us if you are interested in having a workshop at your location.

We offer workshops, training, and private consultations for:

- Professional Metalworkers
- Private & Commercial Aviation
- Automotive Professionals
- Chopper Fabricators
- Art Metal & Sculpture
- Home Builders & Hobbyists
- All skill levels



2016 WORKSHOP SCHEDULE

Schedule and locations subject to change. Classes are generally held at Kent's shop in Nevada City, California unless otherwise noted below.

Apr 22-25	4-Day Metalworking Intensive
Jun 21-23	Air Power Hammer Intensive
Jul 15-18	Metalworking Fundamentals
Sep 16-19	Metalworking Solutions
Sep 30-Oct 3	Fitting, Welding, Planishing, and Finishing
Oct 14-17	4-Day Metalworking Intensive
Nov 4-6	Metalworking for Metal Artists & Sculptors <i>Metalmorphosis Studios, San Antonio, Texas</i>
Nov 11-13	Air Power Hammer Intensive <i>Metalmorphosis Studios, San Antonio, Texas</i>
Dec 2-4	Mastering the Torch: Welding, Brazing and Soldering (15 Methods for Joining)





A TYPICAL WORKSHOP DAY

Each day begins at 8:30 a.m. Over coffee and a hearty breakfast, you meet informally with Kent and the other attendees, getting acquainted the first morning and discussing topics of interest on subsequent days. Morning sessions consist of informative presentations by Kent, demonstrations, and hands-on learning activities related to your areas of interest.

We break around 12:30 or 1 p.m. for a sit-down lunch, which may include instructional slideshows and DVDs, or time for questions and answers. Afternoons are spent getting practical experience with various metal forming tools and individual assistance and instruction with Kent. Class typically ends between 5:30 – 6:30 pm. All workshops are hands-on, instructor-at-your-elbow. Although each day has some lecture and demonstration time, wear shop clothes and be prepared to get dirty!

Our workshops typically cover a different topic each day (stretching, shrinking, forming, repairs, welding, brazing, soldering, etc.), and each is a stand-alone intensive study and practice on that technique. You may attend any combination of days you wish (space permitting), however registration priority is given to participants who plan to attend all days. Common topics are covered in context during each day – for example, planishing, metal finishing, annealing, work-hardening, heat-treating, patterns, and layout.



Workshop Details

- All materials, tools, and equipment needed for the class are provided and are included in the workshop cost. We encourage you to bring along a few favorite tools if you wish, and your TM Welding lenses if you already own them.
- Courses include 8 hours of instruction daily, plus an additional 1½ – 2 hours for meals and breaks. Plan to be in class from 8:30 a.m. to 5:30 - 6:30 p.m. each day.
- Course content is customized to the interests and skill level of each group, based on the students' registration questionnaires.
- Typical class size is 8 students. Classes range from 4-10 students depending on the topic and the amount of shop space required for class assignments.
- Tuition includes class prep materials. Prep materials vary based on the course.
- A hearty breakfast and lunch, plus a late afternoon refreshment are included in your class fee for all workshops held at Kent's shop in Nevada City. Meal arrangements for off-site programs vary (your prep materials will include information on this).
- Students receive a 10% discount on any tools they wish to purchase during the workshop. (Discount does not apply to large forming machines or discounted kits.)
- Class projects, tools, etc. can be shipped to you at the end of class, as needed.

How to Register

We encourage you to register early as our workshops often fill quickly. (We do accept enrollment right up to the start of the course, if space is available.) To register:

Step 1: Call us at **530-292-3506** or email us at workshops@tinmantech.com to pre-register. If you contact us by email or leave us a phone message be sure to include your phone number.

Step 2: You'll receive a pre-registration packet by mail that includes an enrollment agreement and questionnaire (outlining your personal goals for the class). To register, you will need to return the enrollment agreement, the completed questionnaire, and a tuition deposit of 50% (per day attending) to guarantee your reservation. **Note:** Your space in the class is not confirmed until your deposit is received. The deposit is applied against the total tuition for the workshop. The remainder of the tuition due can be paid at the workshop. Deposits are fully refundable if cancellation is received in our office at least 60 days prior to the start of the course. (Deposits can be transferred to another course between 30-60 days prior.)

Step 3: Once you are registered, you'll receive a registration packet approximately three weeks before the start of class that will include any course prep materials you might need (not all programs have prep materials) and general information on area hotels and restaurants, as well as driving directions to our location.





Metalworking Fundamentals

July 15 – 18, 2016 • Location: Nevada City, CA

This course is for those with limited experience working with sheet metal, hand tools, and machines. The class covers layout basics; metal cutting, filing, and sanding; hand skills for stretching (hollows, curves) and shrinking (taking down bumps and making shapes); annealing and joining; and the seven most commonly used machines in metalworking – shears, brakes, English wheels, power hammers, Pullmax, shrinker/stretchers, and the bead roller.

Days 1 & 2 – Hand tools for shrinking and stretching. We begin with a show-and-tell of the many different hand tools used for straightening and fabricating sheet metal. Demonstrations and practice follow, using hammers, dollies, slappers, spoons, and anvils. We also cover planishing, followed by a discussion on metal finishing with files and sanding. Students are given projects for their own practice of these methods, as they learn to form sheet metal into shapes, anneal the work-hardened metal, and cut and trim the metal. Students then learn to stretch and shrink metal primarily using hand tools. An introduction to paper patterns and layout helps you understand how to analyze solid geometry, and how to divide problems into bite-sized chunks. You'll also practice using different shrinking machines to make several compound shapes.

Day 3 – Intro to Welding, Brazing, and Soldering of aluminum sheet, with emphasis on the oxy-acetylene torch. We cover flange joints, butt joints, radius joints, and lap joints in detail. Class time includes approximately 6 hours of hands-on practice, with 99 percent of our students learning to make a good weld on aluminum.

Day 4 – Forming machines. While the Pullmax and Air Power Hammer are used throughout the 4-day course, this class also includes an introduction to the English Wheel (proper setup, clearance, pressures, tracking patterns, and both hollow and reverse shapes), and the Bead Roller. Students will have several hours for hands-on practice with each machine.

Pre-requisite: Sincere interest in metalworking. This workshop is for all skill levels. Some knowledge of basic shop tools is helpful (although we've had students who have never used tools before).

Cost: \$1,595. Price includes all materials, supplies, plus breakfast and lunch.



4-Day Metalworking Intensive

Apr 22– 25 & Oct 14– 17, 2016 • Location: Nevada City, CA

This course is for those with some previous metal shaping experience. The content covered is tailored to the needs of each group of participants. For this reason, the type of information given, pace and class projects will vary somewhat each time offered.

Day 1 – Stretching. Class begins with an introduction to the fundamental concepts of metallurgy and the behavior of metals, so that students can become familiar with and anticipate the responses of various metals to specific forces. Students then learn steps for devising solutions to stretching problems they might encounter, including how to avoid excessive thinning while achieving the fastest stretch possible. Forming machines are introduced and contrasted with hand-forming for shaping bowl shapes, hollows, reverses, fairings, saddles, and curved flanges. Annealing, work hardening, and heat-treating are then covered in the context of both making and repairing parts.

Day 2 – Shrinking. We'll begin by exploring the underlying duality of metal, and how heat and cold, softness and hardness, and thickness and thinness affect the metal's ability to take on new shapes. Typically we will cover nine or more shrinking methods, with applications for shaping, fitting, and making repairs.

Day 3 – Gas welding non-structural aluminum parts. Using traditional aviation teaching methods, each student is expected to make a good weld in 6 hours, just as aircraft factories trained their welders years ago. We also cover torch and tip selection, regulator pressure settings, fluxes and fillers, and demonstrate joint design, geometry, and distortion. Students are given a basic flange joint to master, and when mastered, they move on to the more difficult butt joint. The day includes 2 hours of instruction, critiques, and demonstrations, plus at least 6 hours of hands-on practice.

Day 4 – Forming Machines. We'll use, troubleshoot, and compare the capabilities of the bead roller, English wheel, Pullmax, and Air Power Hammer.

Pre-requisite: *Metalworking Fundamentals*, or several years of metalworking experience, and knowledge of the metal shop environment (common hand tools, measuring, marking, cutting metal, etc.). Class may be repeated as content varies.

Cost: \$1,595. Price includes all materials, supplies, plus breakfast and lunch.



Metalworking Solutions

Ongoing training for graduates of our 4-Day Intensive

Sep 16 – 19, 2016 • Location: Nevada City, CA

Do you ever wish you could come back and ask Kent to help you with things you learned in other classes but haven't yet mastered? Are you finding yourself stuck on a project and need some advice? Would you like ongoing metalworking training and support beyond our 4-Day Intensive? Graduates can now attend our new *Metalworking Solutions* weekends.

These workshops are designed to give you continuing support for the specific areas in which you need to further your skills through direct hands-on training. You will need to bring a project (or have one in mind), and Kent will guide you through the processes you need to get your skill-set to the next level.

Course content for these weekends will vary based on what projects each group of participants brings, and specific metalworking tasks each participant wishes to focus on. Each attendee will receive a questionnaire about their project and topics or issues they would like to go over with Kent individually or with the group.

More advanced or specialized topics may be covered in these weekends that aren't covered in the 4-Day Intensive including: damage repair, making louvers, tank construction, restoration challenges, rust repair and patch panels, patterns and bucks, advanced metal shaping techniques, and troubleshooting project stumbling blocks. The weekends may also include some demonstrations or lecture time, but will primarily be hands-on instruction. The course may be repeated multiple times as the information covered will differ with each group.

Because this class demands more one-on-one instruction time, class size will be limited to a maximum of 4–6 students per weekend.

Pre-requisite: This class is for those who have attended our *4-Day Metalworking Intensive* (please contact us if you have attended another TM metalshaping course and are interested in attending this program).

Cost: \$1,200. Price includes all class materials, supplies, plus breakfast and lunch.



Fitting, Welding, Planishing, and Finishing

Sep 30 – Oct 3, 2016 • Location: Nevada City, CA

While our 4-Day Metalworking Intensive focuses primarily on metal shaping, this workshop is for those who wish to dive more deeply into the post-shaping issues of fitting, trimming, joining, weld smoothing, planishing, and final fit. The course will take you through each step required to construct a large panel with a great fit and finish. For this course you will need to bring several small panels (five or six) that fit at least 60-75%, and that you will join together for your complete final panel or part.

Day 1 – Fitting. We begin by analyzing your panels and the best way to proceed for your specific project. Over the course of the day we will be trimming, fitting, trimming again, and checking edge fits. The goal is to have two or three panels that fit 80-85% by the end of the day, and then be able to determine your “master” panel.

Day 2 – Joining. Once we have chosen your secondary panel, you will tack weld, adjust, and then weld it to your master panel. Various TIG and Torch tacking methods, fusion, “Scot-welds,” and autogenous welds will be demonstrated and practiced. Filler rod diameter and alloys are discussed, and weld beads are leveled. Distortion and weld shrinkage solutions will also be explored.

Day 3 – Planishing. After your remaining panels are fit, trimmed, and welded, we will practice planishing your tack welds and doing final welds. Finished welds will be worked to remedy waves, lumps, and poor fits. Since hems, flares, and wired edges are frequently added to panels, planishing and metal finishing are *very* important techniques to master and will be demonstrated *in detail* and then *practiced*.

Day 4 – Metal finishing. Filing and sanding methods are shown, discussed, and practiced, bringing the work to its final quality level, and finished work to completion.

Pre-requisite: We recommend either *Metalworking Fundamentals*, the *4-Day Metalworking Intensive*, or a few years of metalworking experience and general knowledge of the metal shop environment (common hand tools, measuring, marking, cutting metal, etc.).

Cost: \$1,595. Price includes all class materials, supplies, plus breakfast and lunch.



Air Power Hammer Intensives

Jun 21 – 23, 2016 (Tue – Thu) • Location: Nevada City, CA

Nov 11 – 13, 2016 (Fri – Sun) • Location: San Antonio, TX

If you've been curious to know how the Air Power Hammer can transform your metal working, or if you want to improve your skills with the hammer or learn how to get the most from your machine, this workshop offers a unique opportunity to spend three days receiving direct, hands-on instruction. If you are considering purchasing an Air Power Hammer, this workshop is a great way to spend a few days exploring its capabilities.

Most metal workers are familiar with the two common types of mechanical hammers – the power hammer and the planishing hammer. Historically, electric power hammers have been used for shaping metal, but they are bulky, heavy industrial machines that require large shop spaces and equally large budgets. At the other end of the spectrum are planishing hammers, which are typically low-cost pneumatic machines that can smooth metal by light hitting, but are not effective or efficient for true metal shaping.

This leaves most metal workers doing metal shaping by hand with hammers and mallets on a shot bag, which can be slow, labor-intensive, and hard on arms, shoulders, wrists, necks, and backs. Your instructor, Kent White, designed the Air Power Hammer to address the need for an economical and compact machine that could rapidly shape and planish a wide variety of metals. Kent developed the first machine in 1987, with a goal of creating a hammer that would make shaping operations (stretching, shrinking, forming, contouring, curving flanges, turning flanges around curved surfaces, and planishing) significantly faster and easier for metal workers in shops of any size.

This 3-day Intensive teaches students how to shape metal by shrinking, stretching, bending, flanging, curving flanges and radius bending using the Air Power Hammer. Every student will have the opportunity to make an individual part (or parts). We encourage you to bring your own project (or parts of it), or you may make individual parts in class that are then joined into a larger piece. (Note: Metals used can include steel, aluminum, copper, and stainless.)

Day 1 – Air Hammer basics & stretching strategies. Covers setting up the hammer, operation of dies and die combinations, and assessing how the metal will perform. Stu-



dents will practice several different stretching methods and begin hands-on projects.

Day 2 – Shrinking, making compound shapes, and damage repairs. The second day takes the students further into their hands-on projects by demonstrating how metal flows into shapes and how to make shapes flow accurately. Students will also practice several shrinking methods (hot and cold) that will enable them to make compound shapes and damage repairs more quickly and accurately.

Day 3 – Planishing techniques, joining, and finishing your parts. We will focus on confirming the accuracy of your compound shapes with various techniques for planishing and fitting. Students will practice joining by welding, plus learn how to level and flatten welds for beautifully finished work. On the final day you will spend time using the Hammers to fine-tune your composition and perfect your new techniques.

Pre-requisite: A solid understanding of metalworking fundamentals and some basic shop experience. *Metalworking Fundamentals* or *The 4-day Metalworking Intensive* are useful but not required. Consider bringing a project if you are working on one.

WORKSHOP IN NEVADA CITY, CA (Jun 21-23)

Cost: \$1,200. Price includes all class materials, supplies, plus breakfast and lunch.

WORKSHOP IN SAN ANTONIO, TX (Nov 11-13)

Cost: \$1,300. Price includes all class materials and supplies. Meals are on your own, except for lunch, when we normally all pitch in a few bucks and have some excellent local cooking delivered to the shop.

Kent will co-teach the San Antonio, TX course with George Schroeder, owner of Metal-morphosis Studio, who has three TM Air Power Hammers in his shop in addition to his large industrial forging hammers (which he will demonstrate if students are interested). George recently completed a large-scale public art installation “Sky Wall” in San Antonio using the TM Air Power Hammer. Although this workshop covers using air hammers for all types of metalworking (fab, repair, restoration, automotive, aviation, choppers, etc.), metal artists and sculptors may be particularly interested in this course as George can speak directly to using the air hammer for metal art and sculpture.



Metalworking for Metal Artists & Sculptors

This course is co-taught by Kent White and well-known metal artist George Schroeder, owner of Schroeder Art, San Antonio, TX

Nov 4 – 6, 2016 • Location: San Antonio, TX

This course is designed to help metal artists hone their metalworking skills and learn specialized metalworking techniques that artists are often not exposed to through traditional academic classes. (Note: this class is not intended to cover design or conceptual aspects of metal art or sculpture.) Course content includes: problem-solving, pattern work, bucks, layout, cutting procedure, joining methods, welding, forming and shaping, and finishing. We will discuss and practice various metal shaping techniques for aluminum, copper, mild steel, and stainless, along with discussions on the relationship between materials and their visual and physical impact (looking at chosen materials for their weight, thickness, color, weather resistance, and so on). Hands-on projects will incorporate various techniques to both shape and alter these metals (e.g., cut, bend, anneal, compress, stretch, shrink, etc.). In addition, methods for joining metals will be discussed in detail, such as: oxy-acetylene welding (aluminum and steel), brazing, soldering, and riveting.

Demonstrations and class assignments will focus primarily on sheet metal forming, using hand tools (hammers, dollies, metal and wood slappers, mallets) in conjunction with specialized sheet metal forming machines (Air Power Hammers, hand-held rivet guns, and air-powered metal shrinking /stretching machines). Class will include a segment on metal finishing, including the use of files, sanders, planishers, polishers, patinas, and more.

You will need to bring protective eyewear, ear protection, Kevlar gloves (if you have them), and a couple of favorite hand tools that you frequently use. You are welcome to bring along a project you are working on.

Pre-requisite: *Metalworking Fundamentals*, or basic metal art courses, or equivalent real-world “school of hard-knocks” metalworking experience.

Cost: \$1,300. Price includes all class materials and supplies. Meals are on your own, except for lunch, when we normally all pitch in a few bucks and have some excellent local cooking delivered to the shop.



Mastering the Torch

Welding, Brazing, and Soldering

Dec 2–4, 2016 • Location: Nevada City, CA

Here is your opportunity to learn how to join five different metals three different ways. You'll learn at least 15 different joining operations, and how to apply these skills to your fabrications and repairs.

Day 1 – Soldering. We begin with setting up the torch and regulators, and going over safety. Students then define the soldering job by the strengths and temperatures involved. We'll experiment with cleaning the metals, choosing solders and fluxes, and various soldering techniques. Next, we'll compare joint designs, along with tensile strengths and hardnesses. Then we will cover soldering for repair, construction, and fabrication in detail. Students will learn to join the different metals to each other and to themselves during several hours of hands-on practice.

Day 2 – Brazing. First we will clarify the differences between soldering and brazing, followed by discussion of working temperatures, tensile strengths, and fluxes and fillers used for brazing. We'll also explore popular misconceptions (misinformation) about "hot metal" joining. Students will learn proper cleaning and joint prep, along with the techniques for setting the torch and applying different brazing filler metals. Several hours of hands-on practice are required of all students.

Day 3 – Welding. The day will begin by covering the ways in which welding distinguishes itself from brazing and soldering. Students will learn to weld various joint designs to illustrate the pros and cons of each method. Students are expected to learn temperatures and tensile strength variations between all three methods covered in class. Several hours of student welding practice are required. Also included are joining techniques applicable for chrome plating and anodizing.

Pre-requisite: Open to all skill levels. Sincere interest in oxy-fuel welding. Some knowledge of basic metalworking and shop practices is recommended.

Cost: \$1,200. Includes all materials (sheet metal; welding, brazing and soldering supplies) plus safety equipment and eyewear, and daily breakfast and lunch.



Training at Columbia Helicopters

Private & Small Group Instruction

We also offer private and small group instruction. All instruction is hands-on, so plan so get dirty and have fun. Private instruction is customized for the specific interests and needs of the student(s) attending. Private classes are commonly 1-2 days, and small groups are usually 2-3 days. Cost is based on number of participants and length of training and location. Private or small group instruction can take place at our facility in Nevada City, California, or at your location. Call us for rates and more information: 530-292-3506.

Are you interested in holding a workshop at your shop, school, or hangar?

Do you have a crew or group that needs to improve their metalworking, welding, or forming machine skills, or increase their efficiency? Are you interested in hosting a workshop at your location? Kent can design a teaching program to suit your needs, on your equipment, at your site. Past programs have included instruction on the English Wheel, Air Power Hammer, shrinking and Pullmax machines; oxy-fuel welding, brazing, and soldering; auto body fabrication, restoration, and repair; aircraft sheet metal fabrication and repairs; fuel tank construction and repair; parts fabrication; and metalworking techniques for sculpture/art metal.

Project Consultations

Are you stumped on a metalworking job or need an experienced hand? Kent has consulted on fabrication, tanks, repairs, aircraft, auto, art metal, and more. Project consultations can range from a phone consultation, to a day or two in our shop, or visits to your location. Depending on your needs and the size of the job, you can bring a project to Kent, or he can travel to your facility to instruct, troubleshoot, and assist you in dealing with the issues that you (or your crew) are experiencing. He will help you problem-solve, organize a job flow, and give you hands-on help if required. He can also help you tune-up or modify your equipment as needed. The cost for project consultations is based on the amount of time involved and travel expenses if applicable.

For more information, please give us a call at (530) 292-3506.

Letters from Workshop Attendees

"That was quite a workshop, my head is still spinning with all the information I got from Kent. He answered questions I've been wondering about for years, and he really managed to compress a tremendous amount of instruction in a short period of time. I am making a replica of our class workstation in my garage so I can continue with my practicing. Also, I don't think any of us were expecting five-star food in a welding workshop, so that was an amazing surprise. I feel very fortunate that I was able to attend." – **Joe Doeringer**

"TM Team, I just wanted to let you know how much I enjoyed the seminar I took in April! In addition to the really great instruction, food, and camaraderie... I have regaled my friends about how much fun I had, and I returned home refreshed and very enthusiastic about addressing my daily toils. The confidence that Kent instilled in me to go after metal forming was just what I desired. I could tell that the time I spent filling out the questionnaire was worth every second, as whenever Kent stopped by my station, or I asked him any particular question, the context of his answer, and the approach of working with me toward a solution, rather than just telling me an answer, helped me learn how to strategize my approach; that was exactly what I asked for... in addition to Kent providing me with his tricks of the trade." – **Hans Iwand**

"Kent, I didn't really get a chance to properly thank you for the workshop before I left. It was highly instructive and it will take me many months to digest all of the information provided. I really appreciate you spending time passing on this knowledge..." – **Chris Maresca**

"Kent, I just wanted to let you know how much I enjoyed the workshop. You and your whole staff made the workshop an informative and truly enjoyable experience. Your teaching style made the workshop – you managed to dispense your lifetime of experience in bits and bites that made it easy for all levels of students (even teachers) to understand, learn, and practice a skill. I look forward to taking another course in the future." – **Gary L. Hutchins**

"Kent, I have got to thank you and your staff for the friendship and great time I experienced attending the Metalworking Intensive workshop. Travelling from Sydney, Australia was worth it. I have taken home with me new skills and a better understanding of how to approach some problem tasks. I found that although everyone in the class came from differing backgrounds and specific interests, we could all share from each other. To spend time with somebody who restores Cord motor cars, a lady who does blacksmithing, and an airline pilot was a lot of fun. The way you teach and the fact that you take time to show each person how to work with metals, was great. A fantastic learning experience and I recommend it to everyone interested in metal working." – **David Dent**

"Just a few words of gratitude for the class I was lucky enough to attend. I think about the experience often. Everyone at TM made it the exceptional experience that it was! One of the most important aspects of the class, to me, is the respect for tradition which Kent conveyed. Many thanks again for the inspiration!" – **Jim Tiberti**

CONTACT US

Info & Orders
530-292-3506

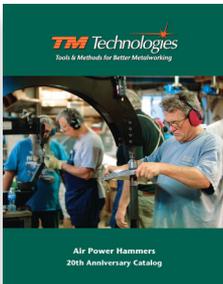
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