

Western States Blacksmithing Curriculum 2008

Draft copy

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**John Crandell CBA Education Committee Chair
Doug Kluender AABA Education Committee Chair
Georg O’Gorman CBA Safety Committee Chair
Mark Aspery CBA/AABA Member at large**

It is intended that there be three curricula —Basic (level I), Intermediate (level II) and Journeyman (level III). Each advancing curriculum will build upon the last with levels I and II supporting the level III grill project. All courses are designed to develop the students blacksmith skills in the forge environment only.

The level I and II curriculum should be completed in-between 45 and 60 hours, with the level III completed at the students own pace.

Formal instruction will be supplied for the level I & II curriculum with the instructor taking on more of a coaching position for the level III course.

Courses are ‘self assessed’ by the individual student or ‘internally assessed’ by the course instructor. No qualification or certification process exists at the moment except where instigated by the participating organization.

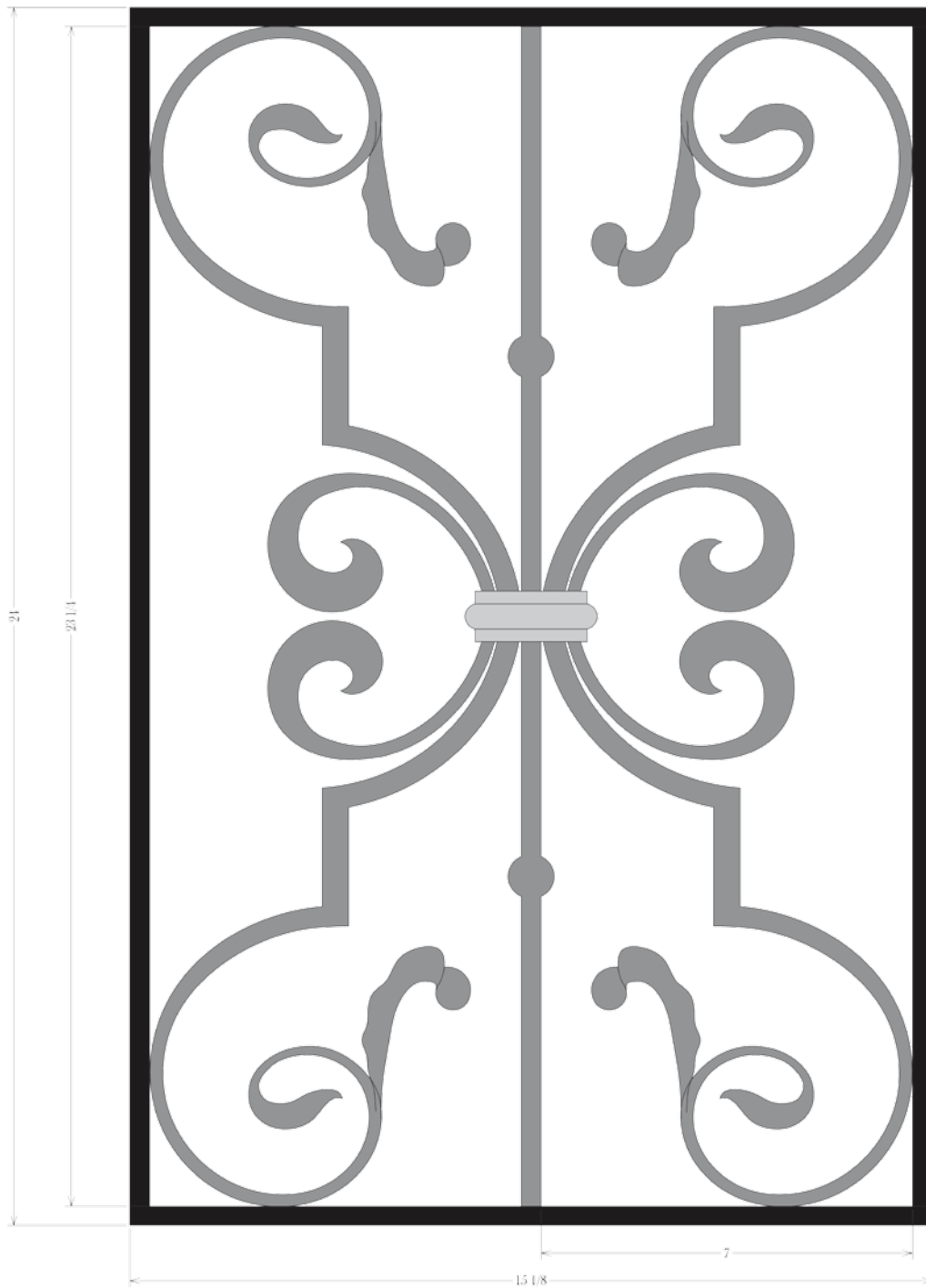
It is anticipated that the student will have to rely solely upon the teaching organization for tools and equipment while attempting the level I course. The student should have purchased the ‘bare essentials’ of blacksmithing before attempting the level II course as practice will be required outside of structured course time. The level III curriculum requires that the student make arrangements to have their own place of work with the instructor taking on more of a coaching role than direct instruction.

Instructor training will be made available to those persons wishing to teach.

- An assistant instructor will have completed the level I course and be involved in the level II curriculum.
- An instructor will have completed both level I and the level II courses.
- A journeyman instructor will have completed all three levels of curriculum.
- All will have completed a ‘step by step’ storyboard of an item contained within the level they wish to attain together with a short public demonstration of the piece.

Instructors will be current in membership with their relevant ABANA affiliate blacksmithing association. Instructors agree to abide by the WSBC safety policies as a basic guideline for safety protocols unless the local affiliate has a more conservative approach to a given situation, in which case, follow the local guidelines.

Aspery/Crandell/Kluender/O’Gorman



3/8 x 3/4 outer frame and center bar

McLellan Blacksmithing 6041 Riverside Bar Road Livermore, CA 94550 916 632-3766 Fax 916 632-5781 www.McLellanBlacksmithing.com		CBA Journeyman's Project all sizes		Sheet Number	000
Date	09/08/07	Revised	07/00		
Scale	None	Drawn by	John M. McLellan		

Western States Curriculum Level III – Forging to Dimension.

Skills involved and tools needed. From this list the Level I and II curriculum will be formed.

Bevelled Scrolls and Bevelled Leaf Scrolls

- Scrolling tongs
- Scrolling wrench (dog wrench)
 1. Vice jaw inserts
 2. Top fuller
 3. Case hardening
- Scrolling Horns (vice or anvil mounted horns)

Water Leaf

- Leafing Hammer
 1. 7/8 by 1/8 slot punch
 2. 7/8 by 1/2 hammer eye drift #1
 3. Hammer eye drift #2 (tapered eye) -modified Klien tools product 3251.
- Leafing stake
- Crimping stake
 1. Case hardening
 2. Top fuller

Forge welding

- Faggot welding
- Jump welding

Upset square corners

- Center punch

Collar

- Bottom swage
- Shaped top tool
 1. 7/8 by 1/8 slot punch
 2. 7/8 by 1/2 hammer eye drift #1
 3. Hammer eye drift #2 (tapered eye) -modified Klien tools product 3251.

Welded Ball

- Concave top butcher or guillotine
- 1 inch bottom swage (if you don't go with the bottom butcher)
- Concave bottom butcher
- Male ball (if we can say that!) – to make the tools listed below
- Bottom ball tool
- Top ball tool (Rodded)
- Flatter

Tenons on frame

- Flat butcher
- Smoosh-a-matic
- Monkey tool 5/16 inch
 1. 7/8 by 1/2 hammer eye drift
 2. 7/8 by 1/8 slot punch
 3. Case hardening

Western States Level I –Basic/Novice (learning)

This certificate will be awarded to those who have completed the Level 1, basic training or the equivalent. It is intended that the participant, at the completion of this course, should possess the basic skills and tools needed to be both safe and productive in their own workshop. They will have presented to their instructor, the Farm Gate Hook (see drawing, Appendix 1) and have passed a safety test. By doing so they have shown an understanding of the basic skills of a blacksmith including:

- Safety
- Nomenclature of the anvil
- Hammers and types of hammer blow
- Tapers (Square Octagon Round)
- Hand held round punch
- Punching a round hole
- Hot cut (chisel or top tool)
- Heat treatment
- 7/8 by 1/8 Slot punch (or equivalent)
- Hammer eye drift (1/2 by 7/8)
- Monkey tool (pre-cursor to making a hammer level II)
- Butcher (chisel or top tool)
- Round tenon
- Smoosh-a-matic
- Forge-welding (faggot weld)
- Upsetting
- Bending over the bick or horn

This course introduces the foundational knowledge and skills that comprise the basis of all blacksmithing production in the forge environment. The student will be introduced to the basic techniques of forming, forging, cutting and joining of steel. Management of the fire and workshop safety are intrinsic to the achievement of this unit.—

The course is internally assessed.

Forging; Upsetting, drawing down, transitions and spreading

Forming; working the material in 2 dimensions such as bending, twisting and dishing

Cutting; Punching, drifting, splitting and chasing

Joining; Forge-weld, riveting and mechanical joints

Tools required for level I

Personal safety equipment (PSE) —Eye and ear protection, adequate footwear.

Forge (gas or solid fuel)

Anvil -securely mounted

Post vice -securely mounted

Tongs for

-3/4 inch round bar ('V' bit)

-1/2 inch square bar (Box jaw)

-1 inch square bar (open or box jaw)

Use

Chisel, round punch, slot punch, hammer eye drift and butcher

Tapers, tenon and forge-welding

Monkey tool

Hammers

Cross pien hammer

Farriers rounding hammer (optional)

Annealing bin (vermiculite, lime or wood-ash)

Used Farriers rasp with handle

14 inch half round file -bastard cut -with handle

Flux

Case hardening compound (Kasonite)

Worn file or carborundum piece for tempering

Smoosh-a-matic

Drill press and 5/16 drill bit (monkey tool)

All struck tools will be dressed at the struck end removing any 'mushroomed' ends

Handles will fit snugly into hammer heads or top tools

Western States Level II –Intermediate (some skills/still learning).

This certificate is awarded to those who show competence in all the skills required at the basic level. In addition, they will show they can apply those skills in the construction of articles. They will begin to learn how to make the tools required for this and the third level, Forging to Dimension. To receive this certificate, the blacksmith will present to their instructor a complete rectangular frame that uses traditional joinery (two L-shaped pieces with one end tenoned and the other punched with an upset square corner between). The frame is to be filled with either two ‘S’ or ‘C’ type scrolls (with different ends on each scroll) and the scrolls collared together. It is suggested that the student first produce a drawing and practice Forging to Dimension. Refer to Intermediate Grill Drawing (Appendix 2) By doing so they will have shown competence in the Intermediate skills of a blacksmith including: Some understanding of techniques of repoussé is expected to be demonstrated by the student.

- Leafing Hammer
- Rodding a top tool
- Making a heading plate for bottom tools
- Cape chisel (may be needed for heading plate)
- Hardy Tools [bottom tool for collar] (case hardening)
- Scrollwork and scroll-form E.G. Ribbon scroll, Fish tail (scroll form) Half-penny and beveled scroll.
[this gives a good cross section of scrollwork]
- Scrolling wrench (and case hardening)
- Scrolling tongs (and riveting) (draw out or forge-weld on reins)
- Open or flat jaw tongs (forge-weld on the reins)
- Collars and collar mandrel
- Forge-welding (Lap or drop tong weld)
- Upset square corner
- Example project;
 1. Complete a rectangular frame using traditional joinery (two ‘L’ shaped pieces with one end tenoned the other punched, with upset square corner between)
 2. Fill frame with either two ‘S’ or ‘C’ type scrolls (with different ends on each scroll) and collar scrolls together using a shaped collar material such as half round.

Completion, of these skills, is expected to take approximately 50 hours. It is assumed that the Intermediate blacksmith has their own shop and most of the basic tools. Some of the skills (for example, making a heading plate for making bottom tools) will be taught at regional instructor workshops.

This course is intended to support the Western States Level III curriculum

This is a specialist course and as such builds on level I by introducing a wider and developing range of forging techniques and equipment. The student will take on greater responsibility for themselves and colleagues in the workshop environment with particular reference to the management of their own workspace and associated processes/tooling.

This course is internally assessed.

Tools required for level II curriculum.

Personal safety equipment

Forge

Anvil

Post vice

Hot rasp

File (14 inch half-round —Bastard cut)

7/8 by 1/8 slot punch

Hammer eye drift (1/2 by 7/8)

Final hammer eye drift

Guillotine with fullering dies or matched top and bottom fullers

Heading plate for top tools (or make on course)

Tongs for;

3/4 dia round or 'V' bit

3/4 square tongs or 'V' bit as above

1 1/4 'V' bit or open jaw tongs

3/4 x 1/4 box or open jaw (scrollwork)

1 by 3/8 box or open jaw (Scrolling tongs)

1/2 dia round (Stock for welded reins on tongs)

1/2 square OR 'V' bit as above

1/2 by 1/4 OR 1/4 open jaw for collar stock

Western States Level III -Forging to Dimension

Level III -Forging to Dimension/Journeymen (lots of skill/still learning). This certificate is awarded to those who shown expertise in all the skills required at the more basic levels. In addition, they will show they can apply those skills in the construction of articles and they will become proficient in making the tools required to produce the Journeyman's Grill. To receive this certificate, the blacksmith will present to their instructor, one of two completed projects:

- 1) The Journeyman's Grill (The actual working drawing must be presented with the completed project). See Journeyman's Grill Appendix 3.
- 2) A Grill of the Blacksmith's design (pre-approved by _____) that demonstrates skilled application of repeat elements, joinery (at least two forms of joinery, one of which must be a forge-weld), leaf work, upset square corners, and _____

By doing so they will have shown mastery of the Intermediate skills of a blacksmith and the following:

Tool Making
Leafing Stake
Crimping Stake
Male blank for making top and bottom tools together with the tools
Tools for manufacturing and manipulating shaped collars
Forging to dimension
Repoussé
Forge welding
Collars
Mortise and Tenons
Riveting
Joinery
Scrollwork
Framing
Upset square corners

Completion, of this project, is expected to take approximately _____ hours. It is assumed that the Journeyman Blacksmith has their own shop and most of the basic tools and that they will only need the guidance of a mentor. It is also expected that the blacksmiths will have made some of their own tools. Some of the skills will be taught at regional instructor workshops.

Appendix 4, Reading List

- The Backyard Blacksmith, Lorelei Sims. <http://www.blacksmithchic.com>
- Mark Asprey. The Skills of a Blacksmith, Volume 1: Mastering the Fundamentals of Blacksmithing.
- The New Edge of the Anvil, Jack Andrews.
- The Blacksmith's Craft (and other COSIRA publications are free downloads on <http://www.countryside.gov.uk/LAR/archive/publications/craftpublications.asp>
- Controlled Hand Forging, ABANA (<http://www.abana.org/resources/education/chf.shtml>)
- Plain and Ornamental Forging, Schwarzkoph
- The Blacksmiths Cookbook, Francis Whitaker

Western States Blacksmith Curriculum

SAFETY PLAN AND GUIDE

PREPARED JANUARY 2008

Western States Blacksmith Curriculum

SAFETY PLAN AND GUIDE

Approved by ABANA affiliate.

XXXXXXXXX
President

XXXXXXXXXXX
Secretary

XXXXXXXXXXX
Vice President

XXXXXXXXXXX
Education Committee

Prepared by

Georg O’Gorman
CA, PE SF566

Forward

Safety is paramount and cannot be overly expressed. Two of the main elements of Safety are:

***Common sense.**

***Attitude.**

Using common sense and having the proper attitude about safety will bring many hours of injury free blacksmithing. There are many potential hazards associated with blacksmithing. The object of this "Safety Plan and Guide" is to minimize these hazards yet allow the Blacksmith to fully enjoy the craft.

We have come a long way in the practice of safety. "Practical Blacksmithing" by M.T. Richardson, which was originally published in four volumes in the 1800's, and still used today as a blacksmith's guide, never mentioned the word "SAFETY". Today we consider safety paramount as we have come to realize that workers and their respective skills are not expendable.

The requirements of this "SAFETY PLAN and GUIDE" are considered to be safety as a minimum and therefore the requirements of this document can always be exceeded.

Safety is no accident!

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1.0 INTRODUCTION

1.1 Purpose

This safety plan defines policy for the Western State Blacksmith Curriculum (WSBC).

1.2 Application

This safety plan will continue in effect until rescinded by the California Blacksmith Association. The safety plan and guide will be revised as necessary to accommodate updates and improvement in techniques.

The requirements and guidelines contained in this plan are applicable to all Members, Instructors, Demonstrators, and Guests attending WSBC sanctioned functions.

1.3 WSBC Safety Policy

The strength of any organization is built upon the collective wisdom and talents of its members. The prevention of blacksmith related injuries will be given precedence over every decision whenever and wherever necessary. It is the policy of WSBC to provide a safe environment and to follow practices and principles which will safeguard all Members, Instructors, Demonstrators and guests.

Safety is the responsibility of every Member, Instructor, Demonstrator, and Guest. All the above are responsible for strict compliance with all WSBC established safety rules and for performing tasks in such a way as not to endanger themselves or others.

In the event of an emergency during a WSBC sanctioned event local 911 services will be utilized. WSBC will provide a portable eye wash for use at sanctioned events.

During a WSBC sanctioned demonstration an area around the Demonstrator of approximately 15ft X 15ft (as a minimum) will be cordoned off. This will provide an uncrowded work area for the Demonstrator and Assistants. The area outside the cordon rope will provide an area reasonably free of risk for observers.

It is recommended that jewelry not be worn while smithing.

1.3.1 Responsibility and Authority

The Education Committee is responsible to ensure that training of WSBC members is conducted in a safe manner. The Education Committee shall ensure that WSBC sanctioned Demonstrations are conducted in a safe manner. To this end Safety Monitors will be solicited from the WSBC membership and assigned to aid the Demonstrator in following the intent of this plan.

WSBC instructors are responsible to conduct the training of WSBC members in a safe manner in accordance with this Safety Plan.

WSBC members under instruction (Level I, II & III) and WSBC members in general will provide their own personal safety equipment e.g., safety glasses, hearing protection, etc.

1.3.2 Disciplinary Action Program

In order for this Safety Plan to work, disciplinary action must be taken when violations occur. The forms of discipline for violations will vary dependent upon the seriousness and frequency of the offense. In most cases a simple discussion with one of the WSBC elected/appointed officers will suffice. However if a member habitually violates safety rules or shows no regard for themselves or others the members affiliation with WSBC may be terminated. It is most important that WSBC Instructors set a safe example for other members.

2.0 **Blacksmith Safety**

2.1 Eye Protection

2.1.1 Impact-Type Safety Glasses or Goggles

Safety glasses and goggles are the blacksmiths first line of defense against injury. Eye protection will be worn anytime a WSBC member or guest is smithing, watching or demonstrating. This is a mandatory requirement.

ANSI approved impact-type safety glasses or goggles shall be worn to ensure greater eye protection from flying particles. The glasses shall meet the requirements of ANSI Z 87.140 with side shields. Poly carbonate lenses meeting these requirements are acceptable. Tasks which dictate the need for such eye wear include:

- | | | | |
|------------|---------------|----------|--------------------|
| • Forging | Forge Welding | Blowing | Pneumatic Tool Use |
| • Scraping | Hammering | Drilling | Punching |
| • Buffing | Grinding | Slitting | |

2.1.2 Contact Lenses

Contact lenses are not considered approved eye wear when working in the environment that the blacksmith is subjected to.

2.1.3 Face Shield

An approved face shield may be used in addition to eye protection for added protection from flying particles. The use of face shield will always include the use of safety glasses under the face shield.

2.1.4 OX-GAS Welding or Burning Goggles

Approved burning goggles shall be worn to provide protection from ultra-violet radiation. (number 5 shade of lens is considered adequate) Number 5 shade is considered a minimum the shade used shall be appropriate for the operation.

Burning goggles shall be used when ox-gas torch is used for cutting or burning.

2.1.5 Welding Hood

A welding hood with a filtered lens of number 10 shade shall be used to provide protection from ultra-violet rays produced during arc welding. Number 10 shade is considered a minimum the shade used shall be appropriate for the operation.

2.2 Hearing Protection/ Conservation

2.2.1 Approved Hearing Protection

The ring of the anvil is usually greater than 85db and requires the use of hearing protection. Approved hearing protection shall consist of ear plugs, ear muffs, or a combination thereof, which must eliminate the noise exposure to within a permissible limit.

It is ***strongly recommended*** that all WSBC members and guests use hearing protection whenever work at the anvil is in progress.

2.3 Hand Protection

2.3.1 Recommendation for Hand Protection

The need for hand protection is a matter of choice. Some smiths use no hand protection. Some smiths use a glove on the tong/tool or hot metal holding hand and no glove on the hammer hand. The tong /tool or hot metal holding hand is usually closer to the hot work and protection is helpful. However a glove on the hammer hand results in a loss of grip on the hammer handle. If a glove or gloves are used it is recommended that:

- The gloves are made of cotton, or Kevlar.
- If a leather gloves are used the glove on the tong hand be loose fitting so it can be removed quickly. The fit shall be loose enough that it can be shaken off the hand.
- Gloves made of synthetic materials, except for kevlar, not be used. Synthetic materials can melt onto the skin if exposed to hot sparks or flame.

If a glove becomes hot it shall not be soaked in water to cool the glove. Cooling a glove in water can produce steam in the glove. A glove that is soaked with sweat can also produce steam. Therefore it is necessary to have dry gloves available.

2.4 Foot Protection

2.4.1 Recommendation for Foot Protection

Heavy duty, high topped leather shoes are important. Many athletic type shoes are made of synthetic materials and can melt onto your skin when exposed to heat, flame, or sparks and therefore will not be worn in the forging area. Low quarter shoes are not recommended. Sparks or hot slugs can find their way into these shoes.

Closed hi-top shoes constructed of canvas will be allowed in the forging area.

2.5 Clothing

Cotton is the best all-around material to wear. Synthetic materials are not recommended because they melt easily and some may burn rapidly when exposed to flame. Synthetics will not be allowed when working or in close proximity to the forging area.

2.5.1 Standard Work Clothes

Clothing that is in a good state of repair should be worn. Active participants in WSBC sponsored events must wear clothing that covers the tops of their footwear. Spectators are advised to do likewise. Spectators choosing to wear clothing that exposes the legs do so at their own risk.

2.6 Alcohol/ Drugs

WSBC members, WSBC Instructors, and Demonstrators shall not consume alcoholic beverages when:

- Forging.
- Demonstrating.
- Instructing.

Be aware that some prescription and over the counter medications can cause drowsiness.

WSBC will not tolerate the use of illegal drugs at any WSBC sponsored event. Use of illegal drugs will be grounds for expulsion from the WSBC event. *WSBC has a zero tolerance policy.*

2.7 Tool Box Safety Meeting (Safety Review)

Instructors will conduct a tool box safety meeting at the start of each day and prior to beginning a training session. The subject of the meeting will include the contents of this plan, discussion of the pending hazardous operation, or other safety subject as determined by the instructor.

A WSBC representative will conduct a tool box safety meeting prior to a WSBC sanctioned demonstration. The subject will include a discussion of pending hazardous operations.

2.8 Power tools

2.8.1 Pedestal, Bench, Portable Grinders, and Wire wheels

Face shields and safety glasses or mono goggles will be worn when grinding or polishing with a wire wheel. All shirts must be tucked into trousers and loose clothing secured prior to using grinders or wire wheels.

Care should be taken to keep long hair out of harms way.

Guards, work rests, eye shields and other permanent protective devices must not be removed from any grinding or buffing wheel.

Cotton, Hot Mill, or Kevlar gloves are not recommended for use at a wire wheel. In this application a good fitting leather gloves can be used.

2.8.2 Power Hammers

Power hammers come in many sizes and shapes. Power hammers use various sources of energy to produce the high energy required for their powerful striking blow. They all have two things in common. They are efficient and dangerous. Power hammers deserve your respect. When using a power hammer always:

- Keep hands clear of the falling weight (hammer) and anvil/bottom tool or die.
- Wear proper eye protection.
- Wear proper hearing protection.

Having said all that, it is recognized that for every rule there can be an exception. For example when using a treadle hammer with a chisel or chasing tool where good control and accuracy are required it is possible ***with a proper positive safety stop*** to hold the chisel or chasing tool in the hand. This type of operation should only be performed by a smith with sufficient experience; as a minimum Journeyman level.

Insure that the hammer is turned off and rendered inoperable when not in use.

Power hammers will not be used by Basic I and Basic II students. At Conferences students may use power hammer provided they are under supervision.

2.9 Basic Blacksmith Tools

- Hammer- Keep the head tight on the hammer handle. Frequently inspect the hammer face to insure the face is free of pits or cracks.
- Tongs- When picking up tongs assume the jaws are hot. Use tongs that have been adjusted to fit the work. A loose fit can allow the hot piece to fly out of the tong jaws.
- Hardie- Always remove the hardie from the hardie hole before you continue hammering. The sharp edge of the hardie can do major damage to your hand.
- Post Vice- Assume the jaws are hot. When finished with the post vice close the jaws, and put the handle in the vertical position. The handle is one more thing to run into.
- Chisels, Punches, and Drifts- Keep the head free of burrs (mushroom).
- Files- Never use a file without a handle.
- Forge- Assume any thing on or under the forge is hot.
- Compressed Air- Be cautious when using compressed air to clean parts or operate tools.

THE LAST WORD

Follow this safety plan. Get it hot, hit it hard. Have a good time.

BLACKSMITH SAFETY VERIFICATION

1. The two main elements of Safety are common sense and attitude.
 - * True
 - * False

2. The stated requirements of our **Safety Plan** and **Guide** can never be exceeded .
 - * True
 - * False

3. Safety is the responsibility of:
 - A. Members.
 - B. Instructors.
 - C. Demonstrators and guests.
 - D. All the above.

4. Safety glasses and goggles are not required when watching a demonstrator.
 - * True
 - * False

5. The ring of an anvil is less than 85db and therefore does not suggest the use of hearing protection.
 - * True
 - * False

6. In hot weather short pants may be worn while forging.
 - * True
 - * False

7. If a glove becomes hot while forging it should be soaked in water to cool it off.
 - * True
 - * False

8. Clothing made from synthetic materials is best to wear while forging.
 - * True
 - * False

9. Organization members shall not consume alcoholic beverages when:
 - A. Forging.
 - B. Demonstrating.
 - C. Instructing.
 - D. All the above.

10. Match the item in column A with the correct answer in column B.

Column A

- a. Hammer.
- b. Tongs.
- c. Files.
- d. Hot cut hardy tool.
- e. Chisels, punches and drifts.

Column B

- a. Assume jaws are hot.
- b. Always remove before continuing to hammer.
- c. Keep hammer end free of burrs (mushroomed).
- d. Keep the head tight.
- e. Never use without a handle.

Philosophy for Blacksmith safety test.

This is not a test of achievement. All students will get 100%. Any questions missed will be discussed with the student in order for the student to fully understand the safety principal behind the correct answer.

Answers to Safety Test

- 1. True (forward)
- 2. False (forward)
- 3. D. All the above. (Introduction 1.3 second paragraph)
- 4. False (2.1.1).
- 5. False (2.2.1).
- 6. False (2.5.1).
- 7. False (2.3.1)
- 8. False (2.5).
- 9. All the above. (2.6)
- 10. a-d
b-a
c-e
d-b
e-c

All answers are listed under 2.9.