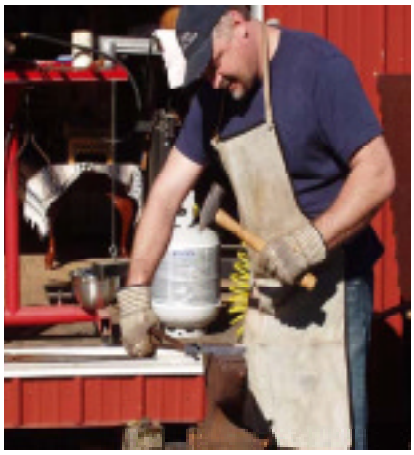
Lake Charles Woodworkers Club, Inc. April 2005

MARCH MEETING HIGHLIGHTS

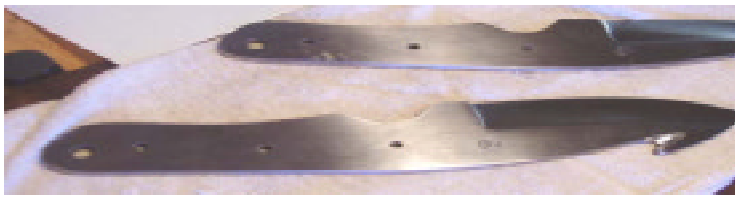
It was a cool bright day and this made watching Gary Smith's demonstration of hand forging but difficult for him as he not could precisely judge the color of the red-hot metal coming out of his propane fired forge. He prefers cloudy days or late evenings as the color of the metal makes all the difference. But it was, after all, a demonstration as Gary would not be turning the railroad spike he worked on into one of the finely crafted knives that are his trademark. At least, not that day. Gary was both our host and speaker this month at his shop.

Hand forging is both an art and science. Gary carefully explained how the metal is turned from a molded railroad spike into a beautiful cutting instrument.

Over the centuries, blacksmiths experimented with iron and other metals in their search for a more durable metal. The hardening and tempering processes were invented. They also learned different ways to modify the carbon content of the iron, thus allowing iron to be used for even more purposes. A blacksmith needed so many different tools with differing hardness that he was always tinkering with ways to improve the properties of available iron. For example, a punch needs to be hard but not brittle. Knives needed to hold and edge but not be so hard that it takes a long time to sharpen them. All of this led to the development of the tool steels and alloyed metals that we have today.



In Damascus, a method of making blades was invented centuries ago. "Damascus" is still the term we use for it today. As when it was invented, the blacksmith welds three differing grades of iron bars together. They are folded over, welded, and drawn out. The process is repeated until the original three layers become 192 (or more) layers. When ground and polished, Damascus has a very intricate pattern



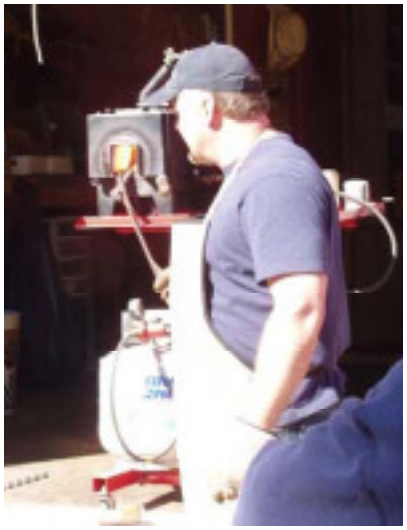
and each blade pattern is unique. The three grades of metal also give the blade a sharp edge that is both easy to sharpen and holds its edge for a long time. A high quality Damascus knife is a work of art and can easily cost over $5,000.

Gary described some of the processes he uses to turn inexpensive steel into a durable knife blade. The pounding (forging) of the steel does two things: flattens it out to a knife shape while reducing the amount of carbon in the steel. When a metal is hot worked, it is shaped while it is above its re-crystallization temperature (usually just above one-half of it's melting point). In these circumstances, annealing takes place while the metal is worked rather than being a separate process. The metal can therefore be worked without it becoming work hardened. Hot working is usually carried out with the metal at a temperature of about 0.6 of its melting point.

Quenching is used with metals that are alloyed with small amounts of other metals. At high temperature the alloying metals are dissolved in the base metal. If the material is cooled slowly, the alloy elements have time to precipitate out separately. If the metal is quenched, however, the alloying metals are trapped within the crystal grains which makes them harder. The precipitates also reduce the movement of dislocations which contributes to the hardness of the material. Quenching is an important process that is used in the production of steel cutting tools. Continues on Page 2.

Coming Up . . . Saturday, April 9, 9:00 a.m. at the McCorquodale (Steve McCorquodale) Mill in Longville, LA. This is the place you get your wood!

HIGHLIGHTS Continues...



At a temperature of around 750 °C, iron has a body centered cubic structure. This type of iron is called ferrite. The carbon atoms can easily be held within this less tightly packed structure in what is called a solid solution.

If the steel is cooled slowly, Gary explained, the iron ions rearrange into a face centered cubic structure called austenite. The iron ions are more tightly packed in this arrangement and can't hold as many carbon atoms within the structure. The remaining carbon forms a compound with iron called iron carbide or cementite. Some regions of the material are therefore made up of layers of ferrite and cementite. These regions are known as pearlite.

If the same steel is quenched rather than being cooled slowly, the carbon atoms do not have time to form cementite. They are trapped within a 'frozen' austenite structure in an arrangement called martensite. Movement of dislocations is very difficult in this structure so the metal becomes very hard and brittle. By carefully reheating the metal, the very brittle steel can be made a little more ductile and therefore more suitable for cutting tools.

Gary said that there are many variation of these techniques. Gary also described several types of steel he uses including spring steel and high speed steel. Gary is also a carver working in wood and bone (as well as engraving the knives he makes).

Show and Tell brought several items from members including many more of Jimmy Evert's canes, a large tower clock scrollwork by Mr. Eltee Thibodeaux, a large plaque in the shape of Louisiana by Ed Blessing, an oak bowl plus tree ornaments by Gary Rock and a spalted cherry bowl by Dick Trouth. Part of Gary Smith's shop is devoted to displays of his work in bone carvings, wood carvings and more. See all of these wonderful items on our web site at www.lcwoodworkers.com.

A FEW SPIRITS

We all use various sovents (spirits) in our shops and around the home for various projects. Below we have listed some of the more common ones and their intended use. A solvent is a solution that breaks down the essential properties of paints and varnishes, lacquer, shellac, oils, grease and adhesive residues. There are many different kinds of solvents, each performing a specific reaction with a specific product. All solvents, except for water, have a toxic effect on organic tissue, biochemical, physiochemical and neurochemical.

Denatured alcohol is simply ethanol that contains a chemical rendering it poisionous to drink. It can be used as a general cleaning agent and as a thinning (reducing) solvent for all aniline dyes and shellac products. It cannot be used for reducing other coatings but can be readily used for alcohol stoves as it has a low vapor and low odor. It has a fairly high flammability and the flame is colorless.

Kerosene (1-K grade) is generally used as a fuel for kerosene stoves and heaters. Though typically used as a fuel, kerosene has very strong solvent properties. For 'oil glazing' in decorative finishing, kerosene is sometimes employed to make the glaze 'hot', increasing the workable time with the glaze, as well as 'fusing' with a glaze previously applied. No more than a capful per gallon is used and adding kerosene to any paint product is not recommended. It has a low fammability and is sometimes used as a very light lubricant.

Boiled Linseed oil is a treated linseed oil designed to dry (raw linseed oil will not dry). It has good water repellent and additive properties e.g., equal parts of boiled linseed oil, paint thinner (or gum terpentine) and long-oil polyeurethane (plus a few drops of Japan dryer), make an excellent finish for most wood projects.

Paint thinner (AKA mineral spirits) is the most common solvent for general reducing. It can be added to oil-based paints, used as a cleaning product (with care and plenty of ventilation) and used to reduce polyurethane. It is basically an oil based solvent ideally used for thinning oil based exterior and interior varnishes, such as oil varnish, and paint products, as well as an efficient solvent for artist's oil paints. Continues on Page 3 . . .

SPIRITS continues . .

Lacquer thinner is used to dilute, dissolve and clean up lacquer products. Typically too caustic for oil paints, lacquer thinner is often used additionally for removing inks on metal and adhesive residue from a variety of surfaces. Lacquer thinner is very strong and rapidly deteriorates many surfaces and fabrics. Always test in an inconspicuous area before use as a cleaner.

Gum turpentine is one of the best oil paint reducers and is extracted from pine trees. It is literally a refinement of the sap from this tree. This solvent will aid coating, bonding and penetration of all types of wood surfaces. There are two types: regular and pure. Neither is a good cleaner as they both leave a gum residue. As it smells nice, it is always a good substitute (for paint thinner) for reducing polyurethane.

Acetone is fast evaporating and will dissolve epoxy (prior to set-up) and several plastics and synthetic fibers. It has a high vapor and so is generally not suitable for reducing most coatings (except of epoxy-based products). Acetone (like alcohol) can be reduced with water as needed.

Naptha (aka VM&P) is similar to paint thinner but evaporates much faster, therefore decreasing drying time. It has a pleasent sweet smell and is an ideal reducer for most oil-based finishes, including polyurethane.

MEK (methyl ethyl ketone) is a highly caustic solvent. Always use protective hand and eyewear. It is used to dissolve some of the more determined paint problems. Removal of hardened paint on hardware such as hinges and doorknobs by soaking in MEK are common uses for this product. Always test before applying MEK on any object or surface as the powerful solvent qualities of MEK can quickly damage or destroy the item. MEK can be used as a 'hardener' for certain epoxies such as fiberglass resin. It is a substitute for acetone and will reduce with water but is considerably more expensive than acetone and has a lower evaporation rate.

Toloul (toluene) is a strong, fast acting solvent for specific oil based paints, lacquers and adhesives. It has good solvency and smooth evaporation rate that makes it preferred choice of paint chemists. But only use it when the paint or coating manufacturer recommends this product as it is generally too strong for many coatings. Toluene is a colorless liquid with a sweet, pungent, benzene-like odor which is hazardous in high concentrations. Toluene is volatile, readily producing flammable and toxic concentrations at room temperature. It is often used as a solvent for commercial waxes such as the Bri Wax brand. Toluene mixes readily with many organic solvents, but is not soluble in water. Toluene is less dense than water and will float on the surface of water.

Xylol (xylene) is a specialty solvent reducer and is similar to toluene but with a slower evaporation rate. Like toluene, it should only be used if the manufacturer of the coating recommends its use.

Gasoline is typically used as a fuel. Gasoline has very strong solvent properties. It is most often used to remove grease, tar, and waxes. Gasoline makes an excellent solvent for cleaning tools and metal parts. However, it is extremely combustible and must be used with very great caution.

Water acts as general solvent and thinner with virtually all water based interior and exterior paints and varnishes. Most latex and acrylic products break down in water. Artist acrylic paints, watercolor, gauche, tempura paint all use water as the reduction agent.

Except for water, all of these are combustible. In other words the chemical or its vapors will burn or ignite if exposed to a spark, ignition source, flame, fire or pilot light. While a product may be listed as combustible, this indicates that it is at least flammable and should be used with that in mind.

If a product is listed as flammable, it means that it is more flammable than combustible. Either the liquid or a concentration of vapors will ignite from any of the sources that would ignite a combustible liquid, only easier.

If the product is listed as extremely flammable it means that it is very easily ignited. Therefore, much greater caution is required.

If a product is listed as either poison or harmful if swallowed, it means that both the liquid and the vapor can kill you.

In short, always use sovents in a well ventilated area (outdoors — if you can smell it, there is vapor in the air), and always wear protective gloves (preferably a glove that will not dissolve). *Barry Humphus.*