Welding

“ Welding is a process critical to our present state of civilization and technical advancement, yet little understood and most often taken for granted” (Haynes and Storer 1). We are constantly hearing through television and other media sources that the job market for people trained in some sort of vocational skill is in very high demand. Media advertisements are encouraging students to consider a vocational skill when looking at their future. Welding is one vocational skill that has been and will continue to be in high demand.

It is estimated that today, 50% of the gross national product relates to welding and is a part of just about everything you see, including the making of airplanes, ships and different manufactured products, from lawn mowers to big machinery. Welders hold approximately 452, 000 jobs nationally with most jobs related to the manufacturing industy (Welding Career Guidance). Welding also plays a big role in providing energy. Welders are involved in the maintenance and building of offshore oil rigs, pipelines, power plants and even wind turbines (Salary Information).

According to James Hunt, “ Most companies and factories are looking to hire people who have some training with regards to welding. ” To better understand the welding profession, we need to understand the definition of welding, the history of welding, the most common types of welding, welding safety, welding certification requirements and salary levels. At one time welding was simply defined as the “ joining of metals through heating them to a molten state and fusing them together” (Haynes and Storer 2). However, as technical processes have advanced, there has been a need to change this definition.

The two types of welding that currently exist are fusion and non-fusion welding. Fusion welding is the most common type of welding and involves melting the parent metals that are being joined. Non-fusion welding is completed by soldering and brazing (Haynes and Storer 2). Today, the welding definition has even grown to include the process of joining non-metallic materials, such as plastic where materials are fused as a result of heat or a chemical action. As a result, a modern definition of welding has to be all inclusive and should read " the joining of metals and plastics without the use of fasteners" (Haynes and Storer 3).

Even though the definition has grown to include plastics, most welding continues to be about the fusion of metals together to create strong bonds within a building process. The development of modern welding dates back to the first blacksmiths living in the Middle Ages who heated and shaped metals for tools and weapons. This was an extremely important job during this time in history. Blacksmiths heated the metals in a wood fire and then hammered them into tools and weapons, then ground the sharp edges with a stone grinding wheel.

The first recorded instance of solid phase welding occurred in 3000 BC when pictures were discovered inside a Thebee's tomb showing metal brazing occurring. Forge welding developed from heating objects to a certain color and quickly hammering them together on an anvil. James Nasmyth made the first improvements in forge welding in over 3000 years with his development of the convex forge in 1846 (Welding Career Guidance). As the industrial revolution of the 19th century continued, most machinery was made of cast metal.

Because cast metal was too brittle and too large for forge-welding, a process called cast-welding was developed allowing for quick repair of machinery. As the 20th century began, electricity was more widely used and people started using electric carbon-arc rods in the welding process. Oxy-actylene gas welding was also beginning to be used. As WWI began, welding became even more important in the building of aircraft increasing the use of lightweight metals to replace wood fuselages and wings. The demand for lightweight metals continued resulting in the refining of TIG welding and the invention of MIG welding in 1948 (Haynes and Storer 3, 4).

As the decades have past, welding developments have continued at a fast pace and have been closely tied to the development of electronics. (Haynes and Storer 5). Currently, there is almost no limit to what welding can do since the developments in technology continue to grow and " improve its accuracy, quality and versatility" (Why Welding). Welders are currently being trained to operate robots and other automated systems that are using powerful lasers, electron beams and even explosives to bond metals.

Therefore, a modern welder's ability to be able to work with computers and necessary program software is extremely important to the operation of these types of systems (Why Welding). The most common welding process is call Gas Metal Arc Welding, or GMAW. In this process an electrode is continuously fed through the nozzle of an arc torch. As the welder starts the torch, the electrode begins feeding through the nozzle creating a direct current that then creates an arc when it contacts the electrode and shielding gases. The welder controls the arc, filling the weld joint and creating the weld.

Today in more advanced welding, lasers are used in combination with GMAW in a hybrid process to make scalpel-like cuts that are up to one-half inch deep, narrow and very precise (Why Welding). The two other widely used welding methods are Gas Tungsten Arc Welding (GTAW) and Shielded Metal Arc Welding (SMAW). GTAW is a low-heat method that uses a non-consumable tungsten electrode which reduces distortion in thin metals which are commonly used in aerospace projects. SMAW, which is also called " stick welding," uses a flux-coated consumable electrode and is normally used for repair and steel welding (Why Welding).

Welders should be very aware of safety issues surrounding welding. Since it is impossible to control the direction sparks fly when you are welding or cutting, you must protect your skin from possible damage. It is important for the welder to wear clothing that is flameproof. A welding jacket is the garment most welders prefer to use. It is also important to protect your head with some sort of hat. A ball cap is commonly used and is usually worn backwards to allow protection for your neck. Welders must also consider what they wear on their feet.

Heavy-duty leather boots are considered the best choice. Eye protection with special tinted lenses is also a major consideration for the welder. Goggles are a common choice, however, a face shield is the more highly recommended choice because it offers more protection covering the entire face and part of the head. Heavy-duty, long leather gloves are also necessary to protect the welder's hands during the welding process. (Geary 191-197). Even though a degree is not required for someone to become a welder, employment

opportunities are better for those who have received some type of formal training.

Most welding programs offer certificate programs along with associate degree programs (Wide Variety of Careers Available to Welders). You can obtain a certificate in entry-level and concentrated areas of welding, soldering and brazing in high school or in one semester at a community or technical college (American Welding Society). In our area, Gadsden State offers a short term certificate program that requires two semesters of instruction and a long term certificate program that requires four semesters of instruction. Many welders also work to receive optional certification from the American Welding Society.

This certification demonstrates that a welder meets the “ uniform national standards that have been set by the AWS” (Welding Degrees). All levels of certification in welding require that you demonstrate sufficient skill in a specialty area. Welders must also maintain their certification with AWS by reapplying for continued certification every 6 months (AWS). Right out of high school, the starting pay for welders is very basic ranging from $14 an hour to $16 an hour. However, a hard working, motivated welder who is willing to travel can make from $50, 000 a year up to over $100, 000 a year.

Also, the more types of welding you master and the higher level of certification you receive, the more you can earn (Salary Information). Anywhere there is a need for metal to be joined, a welder is needed. This makes welding the most important process in building any sort of stable and secure structure. As the demand for welders continues to grow and as our economy is changing, it is important that students are aware of the

opportunities available to them through the profession of welding (Wide Variety of Careers Available to Welders).