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Why I Don't Weld in Computer Labs

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What is a Computer Engineer doing in a Welding Laboratory?

Until very recently, like many people in DIT, I had never even seen a welding laboratory. To listen to me now, you’d swear I was raised with a welding torch in my hand. That’s not the case, but when I moved jobs in September 2015, I discovered that DIT runs evening courses in welding, so I decided to sign up. Way back, when I was in college, the greatest threat to life-and-limb was either an alcohol-induced idiot injury, or at worst, the risk of burning myself with a soldering Iron. They get pretty hot, sometimes as hot as 215°C. That could give you a nasty burn.

Let’s Have a Look about the Lab

Belt Grinder

When first you walk into room 218 in Linen Hall, on your immediate right is a belt grinder which is used for sharpening tungsten electrodes. Tungsten, as you may know is fairly hard, so you need a pretty powerful belt sander to sharpen them. If you don’t use it properly, you could end up losing a finger or having the tungsten electrode skewer you like a piece of meat.
Hand-Held Grinder

Granted, the instructor may provide a hand-held grinder for sharpening the electrodes, but even that will shower you with sparks of red-hot metal which will make a load of pin-holes in a regular cotton t-shirt. You don’t even want to think what can happen if you use one of these without eye-protection.

Oxy-Acetylene Welding Torch

After the grinders we will move on to perhaps the most dramatic piece of kit in the lab. The Oxy-Acetylene welding torch. This is used either for welding or for cutting plate steel. Given that it operates at about 3,000 °C, it is pretty good at both. This can cut through ½-inch steel quicker than you could cut the meat on your dinner-plate. A few years ago, one of our students accidently pointed one of these at an instructor’s hand. The resulting third-degree burns took nearly six months to heal. Fortunately, the instructor is not vain and put the permanent scar down to occupational hazard.

Oxy-Acetylene Cutting Torch

Fronius Magic Wave 2200 TIG Welder

The most common pieces of equipment in this lab are the welding plants. In this lab, there are three different types. The Fronius Magic Wave 2200 costs about €3,500 and will need to be replaced every 5 years or so. In that way this lab is just like a computer lab. Students don’t want to be using 5-year-old computers, now do they? They will probably run really slowly, and be a bit grubby looking. Likewise, a 5-year old welding plant that has been used by generations of students can get a bit rough around the edges. When welding plant gets that way, as well as looking a bit grubby, it can kill you. There are 16 of these in this lab.

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Argon
The Magic Wave 2200 is mostly used for TIG welding. This is a process which uses the tungsten electrodes mentioned above in combination with an inert gas. Argon. If you have ever been in the courtyard of Linen Hall, you will see three very heavily constructed bunkers containing high-pressure steel bottles of Oxygen, Acetylene and Argon. Argon is an asphyxiant, so, if it is not extracted properly from the lab, it could kill. For that reason the rather noisy extractor fans are running all the time. That noise alone would send most people home for the day complaining of conditions unconducive to work. You get used to the noise, particularly as protective ear-buds are provided to all staff and students.

Hearing Protection
Hearing protection is not the only good reason to wear ear-buds. I know of a welder who was doing some overhead work and did not have ear-buds in. A small piece of molten metal fell from the weld he was doing, and pierced his ear-drum. He has some hearing back in that ear, but he knows he is lucky it didn’t go any further. Again, occupational hazard.

MIG Welder
There are also two MIG welding plants in the lab. These beasts are a lot bigger than the Fronius plants and they use three-phase electricity. If you thought the single-phase electricity in your home is dangerous, it is, just think of something three times as dangerous. Don’t worry about the details, but if something were to go wrong, you wouldn’t be conscious long enough to notice it.
Oxy Acetylene Profiler
The next piece is probably the most unusual. It is an Oxy-Acetylene torch mounted on an electric bogey. The bogey ensures a consistent straight edge when cutting plate steel for welding. The process is the same as for the hand-held Oxy-Acetylene torch we saw earlier, only now the operator must set the bogey speed, ignite the flame, adjust the composition of the flame to get the maximum temperature, pre-heat the metal by running it back and forth over the piece a few times, and then, simultaneously switch the bogey motor on and set the flame for optimum cutting temperature. Easy, once you know how.

Supplies
This lab is used for teaching welding on a number of metals. Aluminium, very tricky, but melting point only 660°C. Stainless Steel 1360°C or Carbon Steel, from 1350°C to 1430°C depending on composition. As a consequence, the lab has supplies of the relevant materials. Sometimes in quite large pieces for particular projects, or sometimes as pipes when doing pipe-work. Only a small amount of materials is stored in the lab at any time, just enough for the class in progress to do their work. The presence of even one of these in, for example, a computer lab, would represent a health-and-safety issue.

Cutting
Of course the steel pipe needs to be cut into suitable sections for welding. This is done with a giant can-opener which rotates around the fixed stainless steel pipe. Mind you, we’re lucky there, because downstairs in the Metal Fabrication lab, they use a guillotine that can cut a 1.3m length of 10mm steel in the blink of an eye. Careful there, you could lose both hands if you do blink.
Testing
Each welding course consists of 10 weeks, two nights per week, Monday and Tuesday, and three hours per night. So, sixty hours of instruction and practice to earn a certificate. At the end of each term students can opt to have their work tested by an external welding testing organization. If a welder wants a certificate to say he or she is qualified to do a particular type of work, then the test costs €134 per test piece. Legally, employers cannot hire a welder to do a particular job unless they have a current certificate for that type of work. The welding certificate expires after 24 months, so if the welder wishes to retain their qualification, then they must be re-certified on a periodic basis. That seems a bit harsh. When you get your degree in other subjects, you have it for live. Anyway, each test only covers one cert, so if a welder wants to be certified for many different materials and processes, they need pay to be tested every two years in each process. A working welder would typically be certified on ten to twelve specific processes. A welding inspector or instructor could hold many times more than that.

Everybody Wears Protective Gar, Always
One minute in an operational welding laboratory will convince you of the need for PPE (Personal Protective Equipment). You won’t be staying long as an observer in one of these labs, let alone using the equipment, without all the necessary protective equipment and clothing. This includes; Flame Retardant Overalls (about €65), Steel Toe Cap Boots (from about €25), Welding Mask (from about €65 to over €250), Welding Gauntlets (about €10 a pair, but these need regular replacement). Granted, the gauntlets are provided by DIT, but that is still a cost that must be covered. DIT staff won’t let you inside the door without the right gear, so in that respect, you’re pretty safe.

Nobody Shows up Late and Nobody Leaves Early
On the evening courses that I am taking, nobody shows up late and nobody leaves early. Why would they? They all want to do the course as they see it as giving them skills that they can use in their future careers. Some, unfortunately don’t see that future in Ireland and are getting the skills they will want to take with them when they emigrate.

The Same only Different
I hope the above piece helps you to understand better some of the issues around the teaching of welding, just one of the processes we teach in Linen Hall. If anybody you know still believes that a computer lab and a welding lab could be considered the same, please refer them to me and I will be only too happy to show them around.