

Welding



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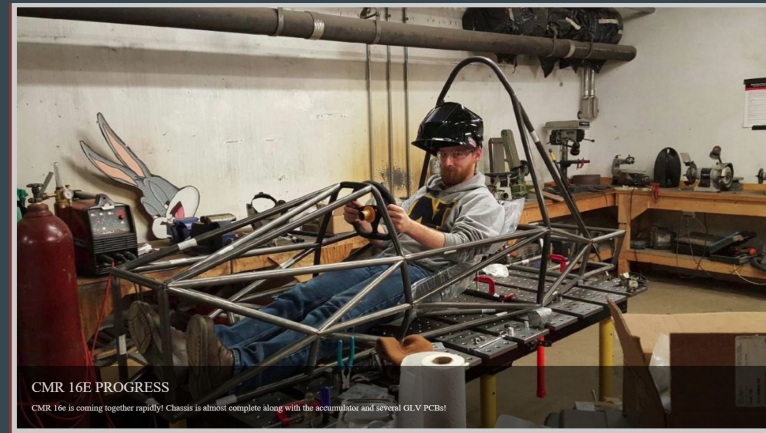


How does welding work?

- There are several different types of welding. The most common is Tungsten Inert Gas (TIG) welding which we will focus on. Tungsten refers to the electrode material. Inert gas means that the torch emits a stream of inert gas (usually Argon) which shields the weld environment.
- An arc of electricity passes from the welding torch to the material; the welder feeds in filler material which is melted by the intense heat of the arc. The melted filler material forms a weld pool which bonds the metal surfaces that are being welded.
- The welder moves in a line, creating a weld bead which then cools in the air.
- <https://www.youtube.com/watch?v=UNAAhwieNhU>

Where Can you Weld on Campus and How to Access It?

- Mechanical Engineering Shop in Hammerschlag C Level -
 - Pay Shop Foremen - Quoted Work, Cost Varies
- Chemical Engineering Shop in Doherty A Level -
 - Pay Shop Foremen - Quoted Work, Cost Varies
- Carnegie Mellon Racing Garage in East Campus Garage Basement -
 - Be on Team/Bribes of Food and Drink
- School of Art MetalFab Shop in Doherty D200A
 - Take class (limited spots, priority to Fine Arts majors), find a friend who has taken the class
- FRC Robotics Shop in Gates
 - Be a member of CMU Lunar or FRC



CMR 16E PROGRESS

CMR 16e is coming together rapidly! Chassis is almost complete along with the accumulator and several GLV PCBs!

When is welding useful?

- Welding is the only way of joining two or more pieces of metal to make them act as a single piece
- Underwater welding is used for pipelines and ships
- Possibility of welding in outer space for putting together space stations
- Car and other forms of transportation production
- Welding is lighter than bolts or riveted joints, better sealed than bolts and riveted joints, and cheaper and more efficient to make than riveted joints, so it is advantageous to use it when two pieces of metal are combined
- Civil engineers utilizes welding in buildings, bridges, etc.
- Steel and aluminum are the most commonly welded metals

What are the limitations of welding?

- Sensitivity to contaminants
 - Metals being welded must be thoroughly cleaned with a wire brush to remove debris, and acetone to remove oils. The parts also must be jugged in order for the piece to be held perfectly still.
- Portability
 - Due to the large argon gas tank, welding is not a portable process. Additionally due the environment constraints, welding must be performed in an appropriate setting.
- Sensitivity to wind
 - An outdoor environment is one of the least ideal places to perform arc welding, for multiple reasons. Most importantly, in the wind the protective argon gas can be blown away, additionally contaminants in the wind can affect the welding process.

What are the limitations of welding?

- Safety
 - The harsh UV light can be damaging to the skin, and even blinding to the eye. The welder as well as any other person in the room must protect their eyes at all time. Additionally if a welder has not been trained properly it is possible to get shocked.
- Like metals
 - A common misconception of welding is that two different types of metals can be welded together. This is false, they must be the same metal.
- Galvanized steel
 - Galvanized steel should not be welded due to its release of toxic fumes.
- Weld knockdown
 - Welding metals can at times weaken the metal itself.