

GMAW vs. FCAW

GMAW

Gas Metal Arc Welding

- This process uses a solid wire and external gas tanks to produce a clean and slag-free weld. Great for high speed production, robotic automation, and little post processing.

To evaluate and compare GMAW and FCAW based on their efficiency, cost effectiveness, and sustainability for fabrication and field applications

FCAW

Flux Cored Arc Welding

- This process uses a wire that houses flux inside the wire to protect the weld from the atmosphere. This allows for deep penetration on thick metals and an all weather / position choice. But has slag that must be broken off.

Efficiency and Cost:

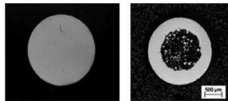
GMAW has a higher filler metal efficiency of 98% therefore most wire becomes part of the weld because its electrode is protected by a precise shielding gas.

FCAW has a lower filler metal efficiency because of slag and smoke loss. It operates at 80%-85%. This is due to a portion of the wire's weight is dedicated to internal flux, which transforms to slag and smoke while on arc.

GMAW lacks the resistance to surface contaminants. The presence of minor contaminants can lead to porosity and defects. Leading to higher labor costs for cleaning the metal.

FCAW has no need for eternal tanks for gas therefore reducing cost in gas transport. Aswell as less worry about "gas drift" cause by any wind more than 5 mph.

Local Use: in Central Illinois, FCAW gets used in industrial fabrication shops for large frames and thick metal for industrial machines and vehicles. Such as Caterpillar or Komatsu. GMAW is used in high production manufacturing for more clean and quick jobs in the area such as Morton Industries and Parsons.



Solid wire Cored wire (tube)

Cross section of both wires

Future Use: Both processes have solidified their future use in the industry and have different uses. The biggest upcoming question is how automation will impact each process. Both processes have some room for improvement, FCAW could be cleaner and GMAW could improve the pulse technology to increase predictability.