Main types of welding - gas metal arc welding, tungsten inert gas, arc welding, g...

Science, Physics

The paper “ Gas Metal Arc Welding, Tungsten Inert Gas, Arc Welding, Gas or Oxy-Acetylene Welding, and Cutting Gas Metal Arc Welding" is an informative variant of a term paper on physics. Welding Metal components are permanently joined without the need for fittings using the four main types of welding. They include;

- Gas Metal Arc Welding (GMAW),
- Tungsten Inert Gas (GTAW),
- Arc Welding (SMAW), and
- Gas or Oxy-Acetylene Welding and Cutting,
- Gas Metal Arc Welding (GMAW).

Also referred to as, “ MIG welding”, GMAW is the most commonly used type of welding. It is ideal for fusing steel (both mild and stainless) and aluminum. The welding wire is positioned at the extreme end of the gun and operates within the preset rate. This method allows for continuous welding. In addition, it is clean with only minimal spatter during the entire process. However, the deposits left are highly oxidized due to incomplete joint fusion. It might also be difficult to establish the initial arc in this type of welding.

Gas Tungsten Arc Welding (GTAW)

This type of welding is employed when high-quality finishes are desired. It is preferred for fusing copper alloys, nickel alloys, titanium, magnesium, and aluminum. Advantages

Welds can be achieved whether the welder uses metal filters or not,

The pinpoints heat evenly as compared to those in GMAW, and

TIG welding does not create spatter; hence very clean.

Disadvantages

It takes longer to complete the entire welding process,

It might prove difficult to establish the initial arc.

Arc Welding (SMAW)

It is a basic type of welding. Arc welding is suitable for heavy metal (4 mm and above).

Advantages

Wind and rain does not influence the quality of the weld, and

Easy to learn.

Disadvantages

It produces splatter during the welding process,

It requires skilled personnel to produce high-quality welds,

The electrode require replacing after a few inches of welds, and

The electrodes fail to penetrate deep into the material.

Gas or Oxy-Acetylene Welding and Cutting

The welding process comprises mixing oxygen gas and acetylene gas to create a flame that can melt steel. It is employed to weld delicate aluminum

pipes and brazing softer metals.

Advantages

It is clean; no spatter is produced, and

Suitable for gas metal cutting.

Disadvantages

Expensive to acquire, and

Requires highly skilled personnel.

Consequences of Improper Welding on Aircrafts

According to Baker, (2004), technological advancements in the late 20th century brought about changes in the manufacturing process in the airline industry. Materials such as titanium, aluminum, and magnesium were utilized to construct aircraft. In addition, new processes of welding were adopted in the airline industry. The Federal Aviation Administration (FAA) provides airworthiness directives to aircraft inspection and maintenance agencies to ensure that proper welding measures are undertaken.

The FAA attributes improper welding to the following causes;

Improper operation welding rod and torch,

Wrong rod alloy,

Improper joint spacing,

Using a dirty welding wire,

Low weld current,

Overstressed weld, and

Fast weld speed.

Improper welding on aircraft results in cracks appearing on the aircraft's' chassis. The cracks include crater cracks, under-head cracks, and longitudinal cracks. In addition, it may result in the incomplete fusion between panels. Porosity may also be evident from the deposits left after using dirty welding wire and aren't material. All the consequences of improper welding expose an aircraft to potential accidents due to disintegration of panels. Such an event would put the life of passengers at risk of injury or death.