Not all dust is combustible. In fact, limestone dust is used in coal mines to reduce explosion hazards. However, materials which can burn or corrode in contact with oxygen can form combustible dusts. These ‘reactive’ materials include: metals, plastics, coal and other carbonaceous materials, grains, wood and paper, and many organic compounds such as additives, solid food products and pharmaceuticals.

Dusts vary in their potential for combustion and in how violent their airborne dust deflagrations may be. For a dust deflagration to happen, it takes a large enough and dense enough cloud of the dust to become airborne at one time and then contact an energy source strong enough to cause ignition.

For some dusts it may take only a static spark to ignite a dense cloud, while others might require an open flame or contact with a hot surface.

Operations that involve heat, such as welding, can easily cause combustible dust explosions. Dust trails on the surface of work benches and materials can even act as an ignition fuse. Therefore, it is crucial that good housekeeping practices are in place at all times to prevent unnecessary dust accumulation.

**Minimising the Risk**

According to AS 1674.1-1997 *Safety in welding and allied processes - Fire Precautions*, prior to the commencement of welding in hazardous areas, the following precautions should be taken to prevent fire, explosion, injury or other danger:

- Identify and control any fire hazard (including combustible dusts) within 15m.
- Consider relevant hazards that may exist outside the immediate 15m radius.
- Consider the possibility of changing circumstances during hot work and whether these may render the area unsafe.
- Properly ventilate the work area.
- Suitably locate the equipment,
including emergency firefighting equipment.
- Isolate the area where the work is to be performed.
- Provide a safe entry to and exit from the work area.
- Test for the presence of any flammable vapours and dusts within 15m and in any pipe, drum, tank, vessel or equipment adjacent to or involved in the work.
- Ensure any vapour is less than 5% of its lower explosion limit (LEL).

All testing should take place as late as practical before the hot work is commenced, subject to it being not more than two hours beforehand.

Once these measures have been implemented, the responsible officer can then perform a thorough inspection of the site, and issue a hot-work permit. This permit may specify that a firewatcher is stationed in the work area, to safeguarding personnel and equipment.

**How to Train Staff**

In the event of a combustible dust explosion, workers are the first call of defense in preventing and mitigating the hazard. If the people closest to the source of the outbreak are correctly trained, they can be instrumental in recognising unsafe conditions, taking preventative action and alerting management to the incident.

All employees should be adequately trained in safe work practices that are applicable to their job task, as well as on the overall arrangement of dust control and ignition source control. They should be trained before they start work, and ideally at periodic intervals to refresh their knowledge.

A qualified team of managers should be responsible for annually conducting a workplace analysis, prior to the potential hazard. Supervisors and managers should be thoroughly aware of the dust and ignition control programs that their workplace has instilled.

**Summary**

It is integral that welders understand the materials present in their working environment, and how they can cause or contribute to a dangerous incident.

Given the right amount of energy and volume, dust or powdered forms of certain types of solid materials can be easily ignited when airborne. This makes it crucial for welders to know when this type of hazard is present, and take all appropriate steps to prevent potentially devastating explosions. All tools, materials and surfaces should be regularly inspected to confirm the presence of flammable or combustible dusts, and any other potential hazards.

**References**

- American Welding Society, Safety and Health Fact Sheet No. 41, Combustible Dust Hazards in the Welding and Cutting Environment.