

Arc Welding and Magnetic Blow

Magnetic arc blow is caused by an unbalanced condition in the magnetic field surrounding the arc.

Welding arcs consist of a stream of electrons travelling from the electrode to the workpiece, if magnetic fields (induced or permanent) interact with the arc's electric field, force fields are generated which will cause the arc's deflection. This phenomenon is known as "Magnetic Blow".

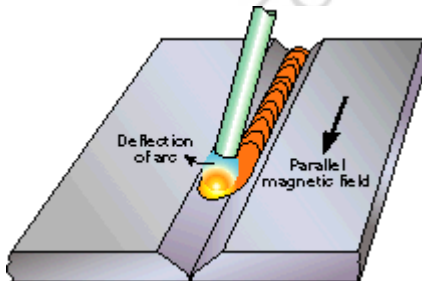


Fig. 1- Illustration showing the arc deflection.

Magnetic Blow can be caused by the residual magnetism present in the material being weld, external source or auto-induced by the arc's current.

The blow and can lead to the possible introduction of defects in the weld, excessive spatter, inconsistent weld penetration, porosity and lower quality (Fig.2).



Fig. 1- Side deflection of arc.

The arc is deflected away from the normal arc path. It can deflect forward, backward, or sideways with respect to electrode and welding direction, depending upon the direction of an external magnetic field.

Generally blow is the result of two conditions:

- Current flow is directed towards the ground (Fig. 3);

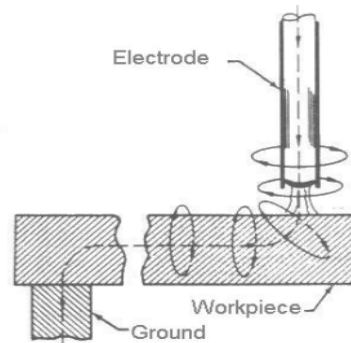


Fig. 3 – Deflection of arc towards the ground

- Asymmetrical distribution of the magnetic field surrounding the arc while welding towards the end of the weld joint. Thus, the arc deflects from the zone with dense magnetic lines of force to the zone with scarce magnetic lines of force (Fig.4).

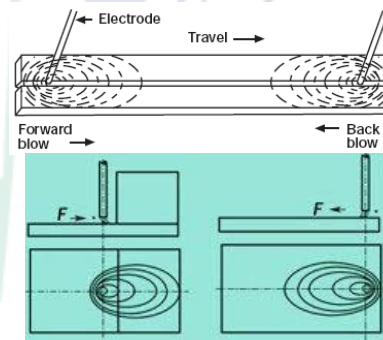


Fig. 4 – Shows how density of magnetic lines affects the direction of arc.

This phenomenon can be minimized. Some possible solutions are (when possible):

- Use alternating current (AC) rather than DC (reduces magnetic effects due to eddy currents induced in the workpiece);
- Clamp the workpiece cable to the work at two or more locations;
- Hold a short arc;
- Append ferromagnetic material to the ends of the workpiece;
- Angle the electrode with the work opposite to the direction of arc blow (Fig. 5).

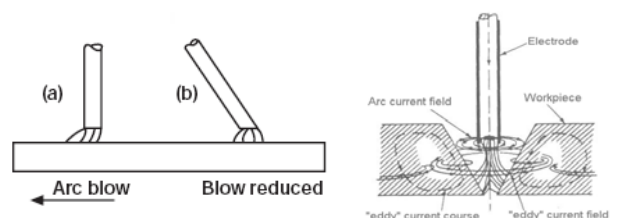


Fig. 5 – Solutions to minimize arc blow