

# The Source of Common Problems in Alloy Welding



## 1. High temperature = oxides

The high temperatures developed in the welding process lead to the formation of chemical combinations between the elements in the steel, rod, and the atmosphere, and these combinations, commonly termed "oxides", will contaminate the welding joint.



## 2. Inclusions = porosity

Gaseous or refractory oxides and dirt included in the weld create stress concentrations; pockets and pinholes often form upon cooling. Frequently they contaminate a section of the weld to the point that porosity and weakness become apparent.



## 3. Poor penetration = weak welds

Many operators, in attempting to avoid oxidation or burn-through, find that insufficient penetration has been achieved. Poor welds of this nature obviously are weak, and reworking frequently becomes more expensive than the original welding.



## 4. Uncontrolled heat = burn-through

Momentary heating in a localized area often will "blow a hole" in the weld seam, completely penetrating and burning through the steel. Pausing during a welding pass to float out oxides is the most frequent cause of burn-through.

Correct heat      Excessive heat



## 5. More heat = more oxides

Alloy steels tend to form refractory oxides when welded and these oxides usually melt at temperatures higher than the steel itself. The application of additional heat by pausing in the welding process will not float out the oxides, but rather will produce more oxides and burn-through.



## 6. Uneven heating = cracking

Pausing in the welding pass in attempts to float out the oxides creates uneven heating, which produces localized stress resulting in strain or warpage. Due to residual stresses, such welds may crack in subsequent service or processing.



## 7. Rough welds = more grinding

Operators, troubled with oxidation and oxide inclusions, cannot produce smooth welds on the bottom surface of the joint, and the top surface frequently lacks uniformity and evenness. Finishing rough welds is costly in both time and money.



## 8. Rough root beads = double welds

Irregularities in the root beads very often necessitate back chipping and a second pass on the reverse side. Even where seams must be double-welded to control warpage, the root of the first pass must be smooth and sound to permit a clean second weld.