

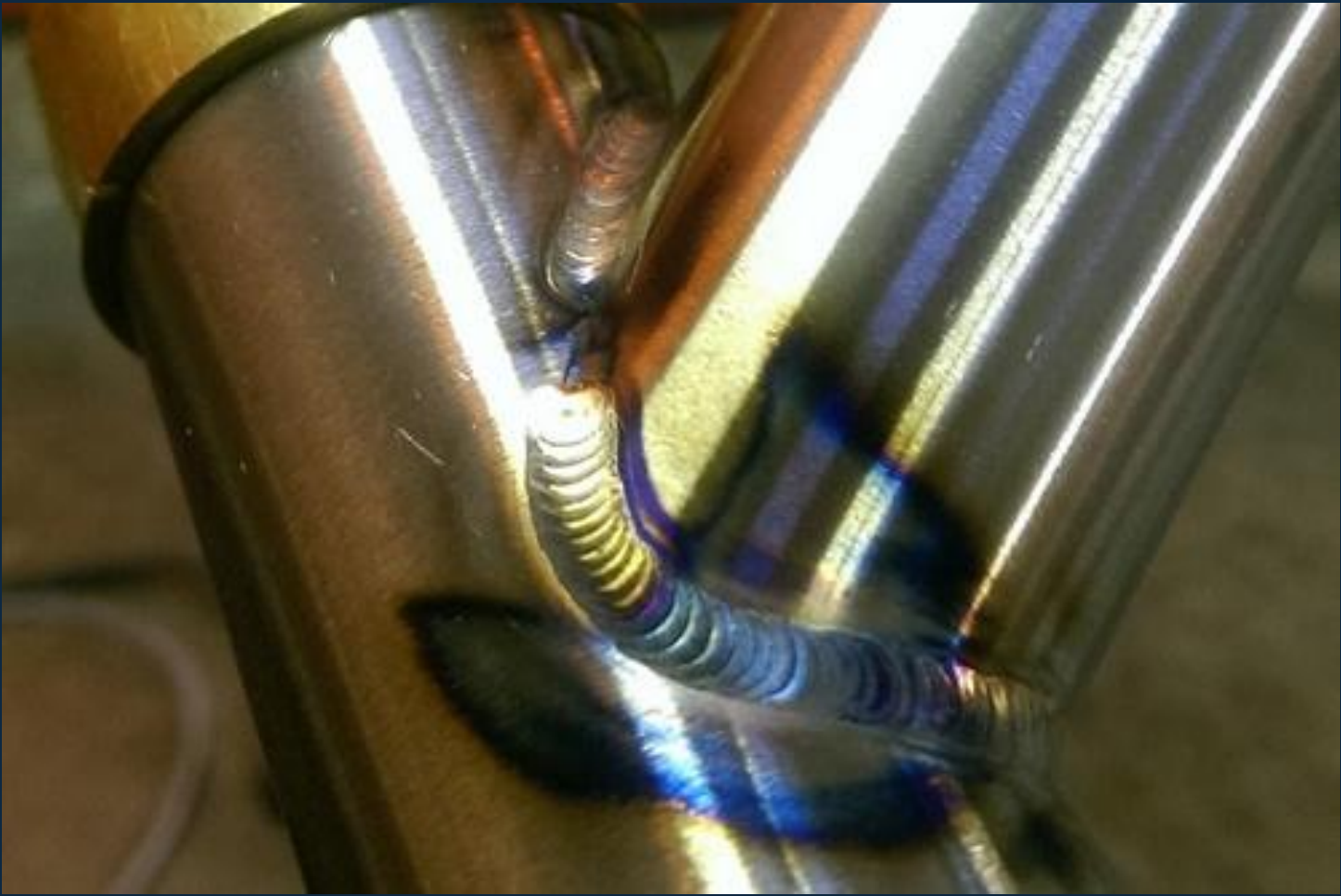
TITANIUM WELD CONTAMINATION

by
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Titanium is a critical material in applications where strength to weight and corrosive resistance are required like aerospace industries, chemical processing industries, and other industries.

Titanium can be welded but doing so improperly can lead to the weld to becoming contaminated which can be indicated by color. Contaminated welds can cause the welds to become brittle and break.

Bad welds



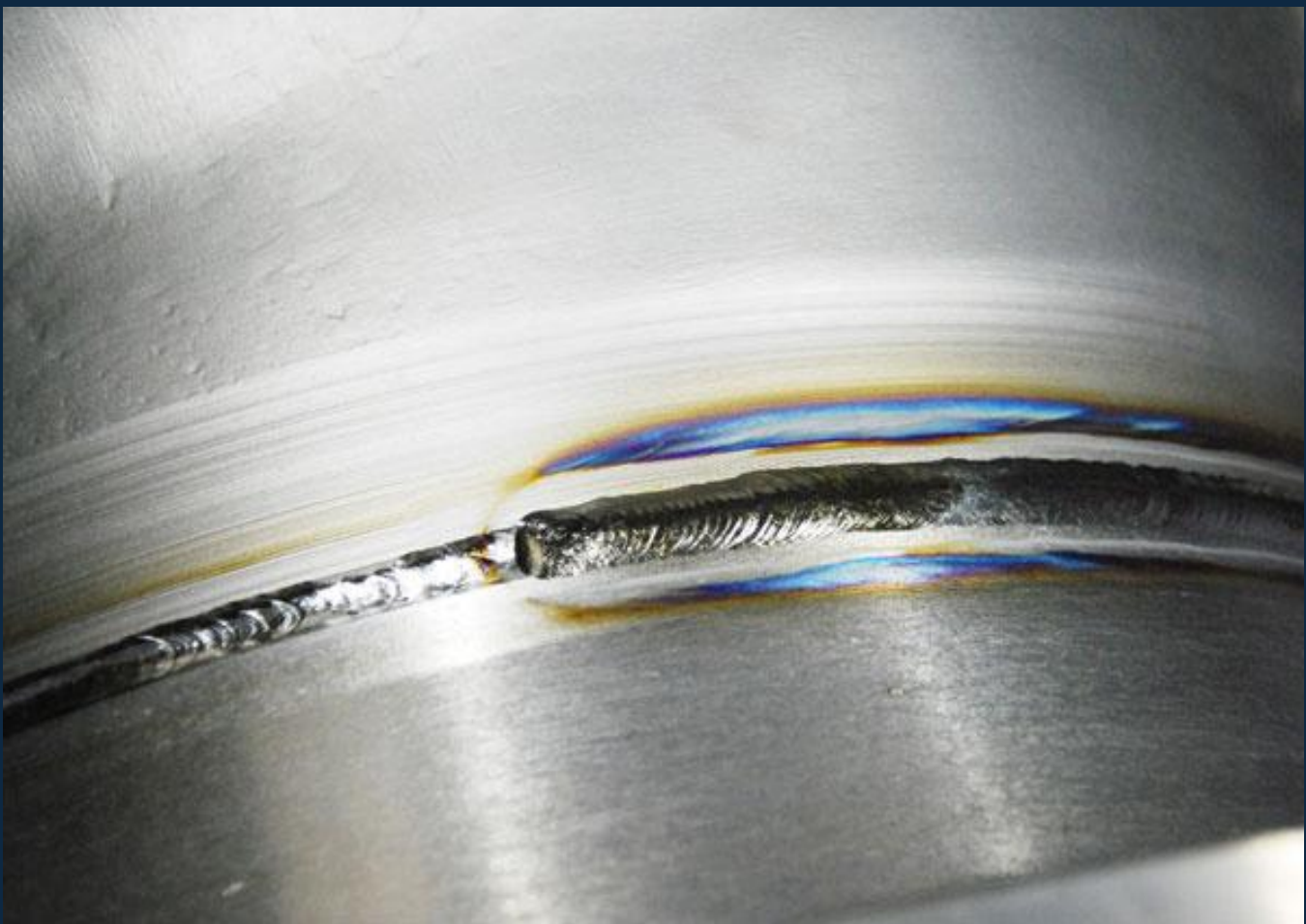
The two pictures here show bad titanium welds, one is contaminated (top), while the other is not only contaminated but has failed completely (bottom).

There can be several causes of contamination

- Hydrogen entering the weld due to
- Inadequate shielding gas
- Improper filler rod storage
- Contaminated surface due to oil, moisture
- Atmospheric exposure if the shielding gas stops before the titanium reaches 500 degrees C.
- Tool Cross Contamination
- Poor technique
- Improper cleaning procedures



Good Welds



To the left and bottom is an example of a good titanium weld bead, and though there is some color variation in the heat affected zone the bead itself is a nice silver color.



The most common titanium alloy used today is TI-6AL-4V which is 90% titanium, 6% aluminum, and 4% vanadium, along with 0.25% iron, and 0.2% max oxygen.

Filler Rods

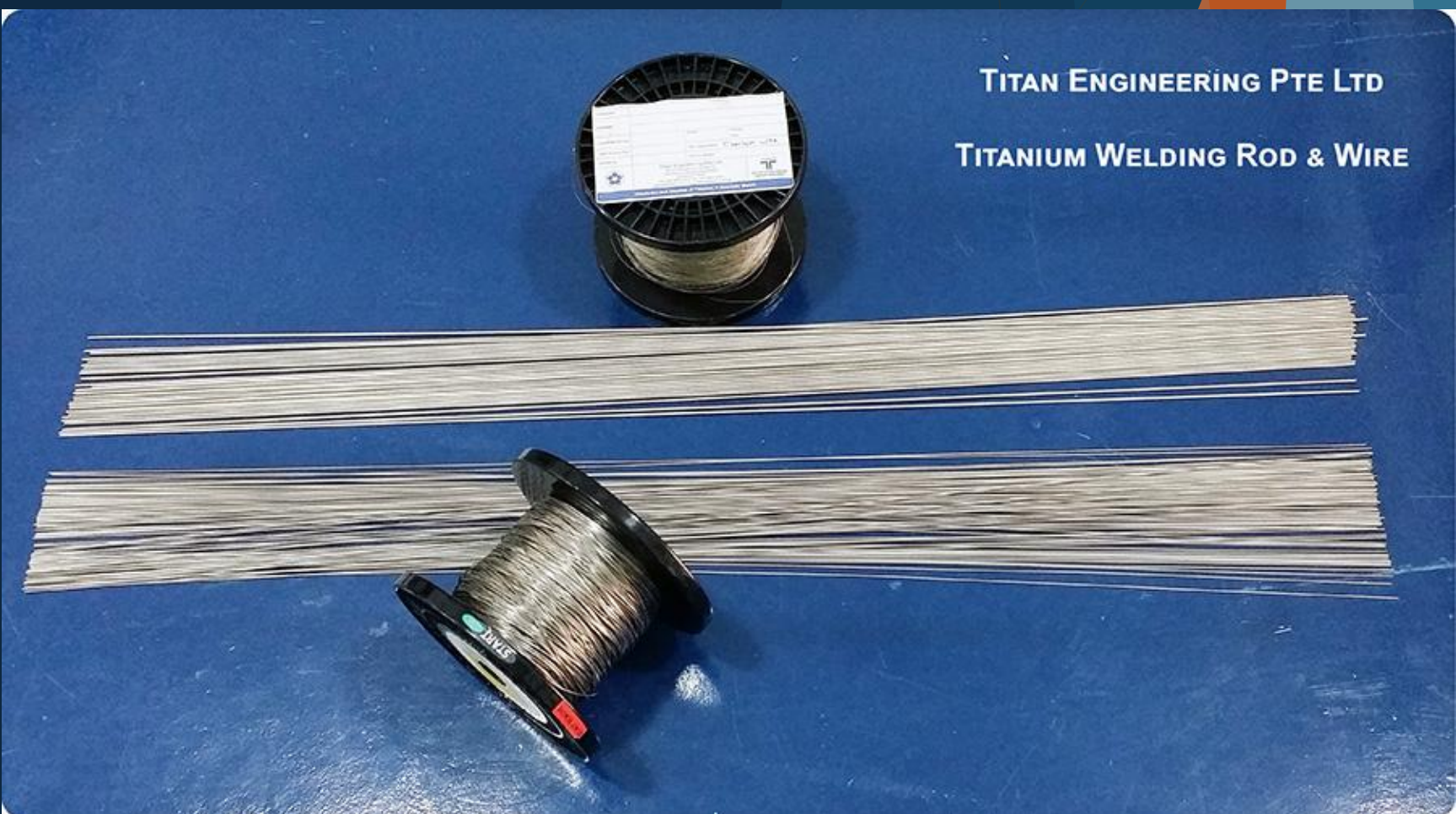
Stick Filler Rod



MIG Filler Wire



TIG Filler Rod



Storage Requirements for filler metal include:

- Temperature control between 18 to 24 degrees Celsius
- Use sealed containers
- Use gloves when handling to prevent contamination
- Maintain a dry, controlled environment.
- Inspected for surface oxidation.