WHAT IS
PTA POWDER HARDBANDING?

PTA powder hardbanding is the process of depositing powdered hardfacing alloys onto drill pipe tool joints, collars, heavy weight drill pipe and other down-hole components to protect both casing and drill string assets from abrasive wear.

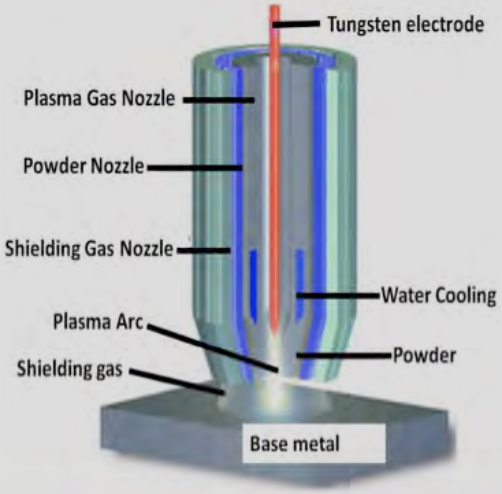
PTA (Plasma Transferred Arc) is a metallurgical bonding (welding) process using the application of a constricted high-energy plasma arc between a non-consumable electrode (powder) and the base material, creating a molten weld pool.

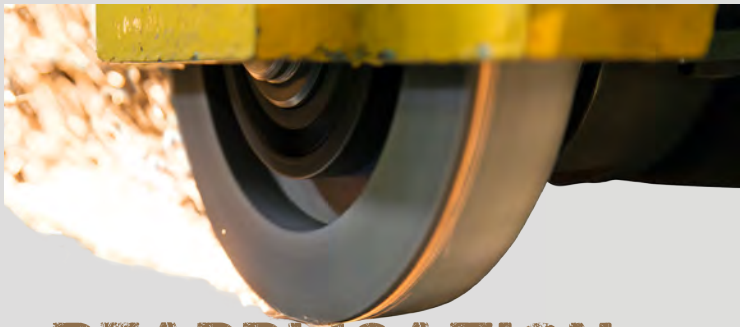
PTA powder process produces overlay that has better fusion and corrosion properties than mechanically bonded processes.

JA Oilfield Services has experience in applying PTA powders on down-hole drilling tools for over 20 years.

FEATURES
OF PTA POWDER HARDBANDING

- The feed material is a fine powder which is a mixture of Tungsten Carbide and Nickel based alloy (spherical carbides).
- Heat inputs are achievable with careful parameter optimization and control.
- Higher wear, abrasion and corrosion resistance than wire alloys.
- Very little dilution of powdered alloy into the base material due to localized heat input.
- More uniform micro-structure & smoother surface
- High bonding and overlay, while introducing minimum heat on magnetic & non-magnetic base metal
- Lesser amounts of steel lost around tool joint after PTA powder hardband wears compared to wire hardbands.





REAPPLICATION
OF PTA POWDER HARDBANDING

- Hardbanding reapplication is dependent on wear and cracking of hardband.
- PTA powder can be reapplied on wire hardbands and vice versa provided the previous hardband is worn down to 1/32 in. or less.
- Higher frequency of wire hardbanding (average of 2 wells) vs. PTA power hardbanding (average of 6 wells) per joint of pipe depending on drilling environment.
- JA has the ability to grind off PTA powder hardbands on drill pipes using a portable grinder.

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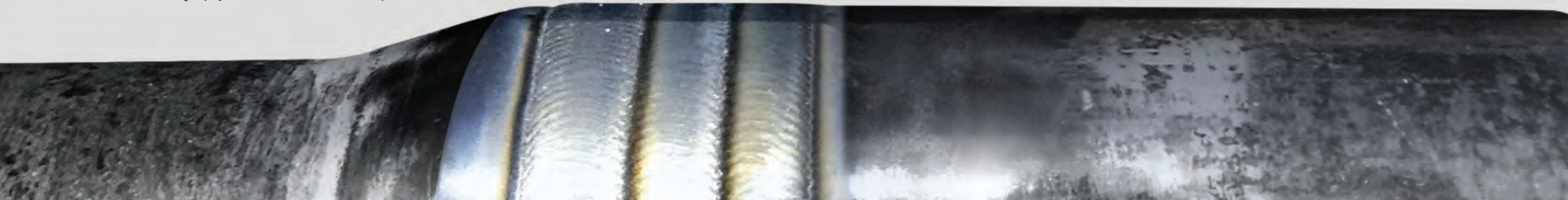

CASING WEAR
TESTING

Test was conducted according to API 7CW standard by Stress Engineering Service (formerly known as Mohr Engineering) on behalf of JA Oilfield Services.

The objectives of the tests were to:

- To observe and determine the amount of wear within a casing specimen that is produced by a rotating PTA powder hardbanded tool joint specimen under a side load in WBM.
- To observe and determine the amount of PTA powder hardband material applied to a tool joint removed by an abrasive cylinder in an open hole.

RESULTS
OF CASING WEAR TESTING

- Casing Wear: 7.22%
- Casing Wear /Hall Wear Factor: 1.33 psi-1
- Tool Joint Wear in Open Hole: 0.0400 in.
- Contact Pressure Threshold: 65 psi
- Revs to 87.5% Casing Wall: Infinite
- Hardness: 38-41 HRc
- ASTM G65-A, mass lost: 0.086 g

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