



Wel-lok M2M™



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Unique Properties of Bismuth



Expands like ice



Viscosity similar to water



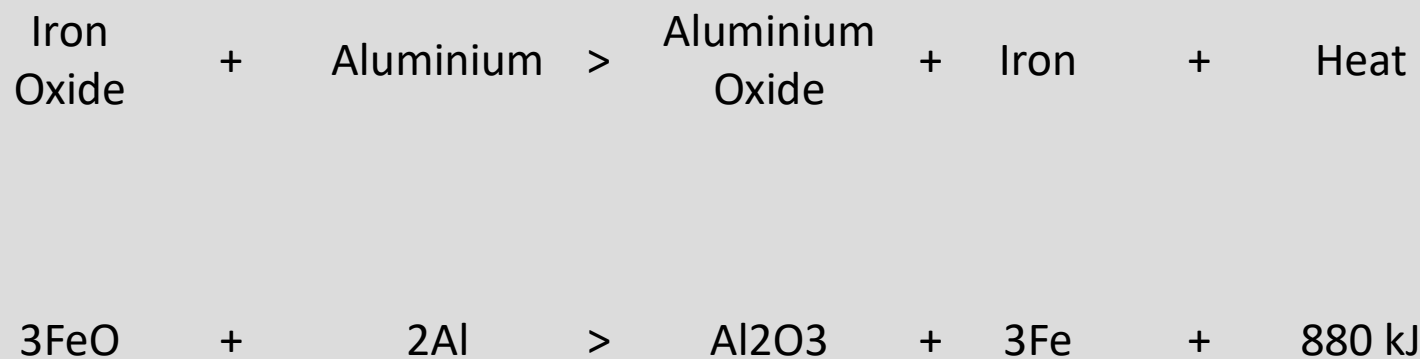
Corrosion resistant



Dense – SG 10

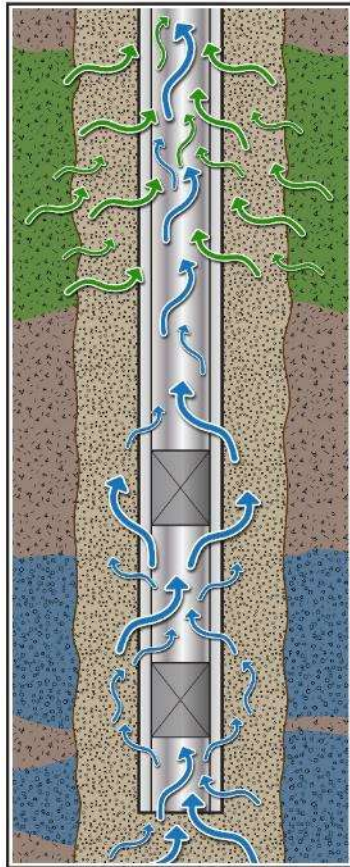
Alloy Viscosity & Expansion

The Thermite reaction



Water shut off through screens

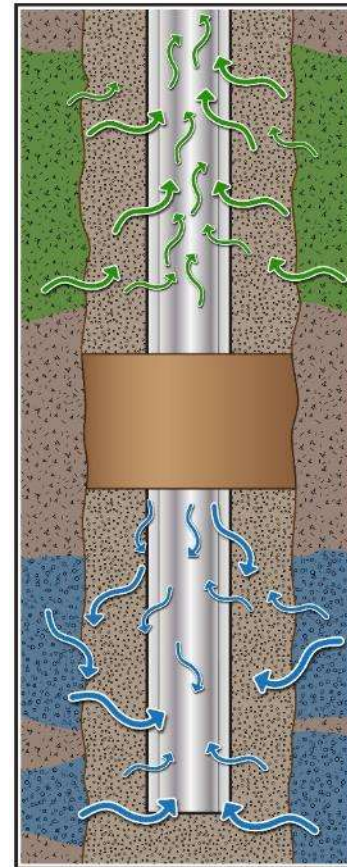
Bridge plug set
inside the screen



Oil Producing
Zone

Watered out
Bottom zone

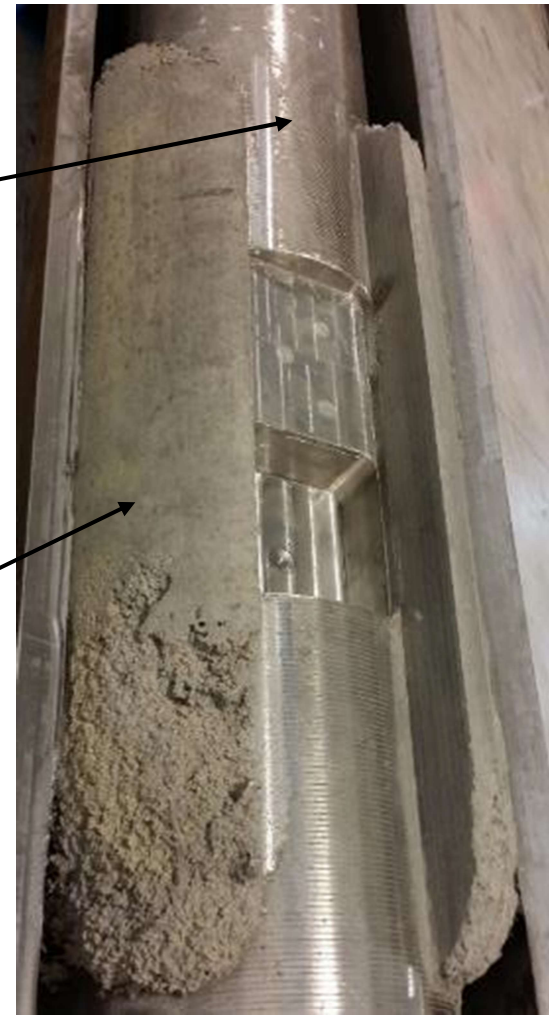
BiSN tool
seals the annulus
& the wellbore





Sandscreen

Alloy plug plus
proppant

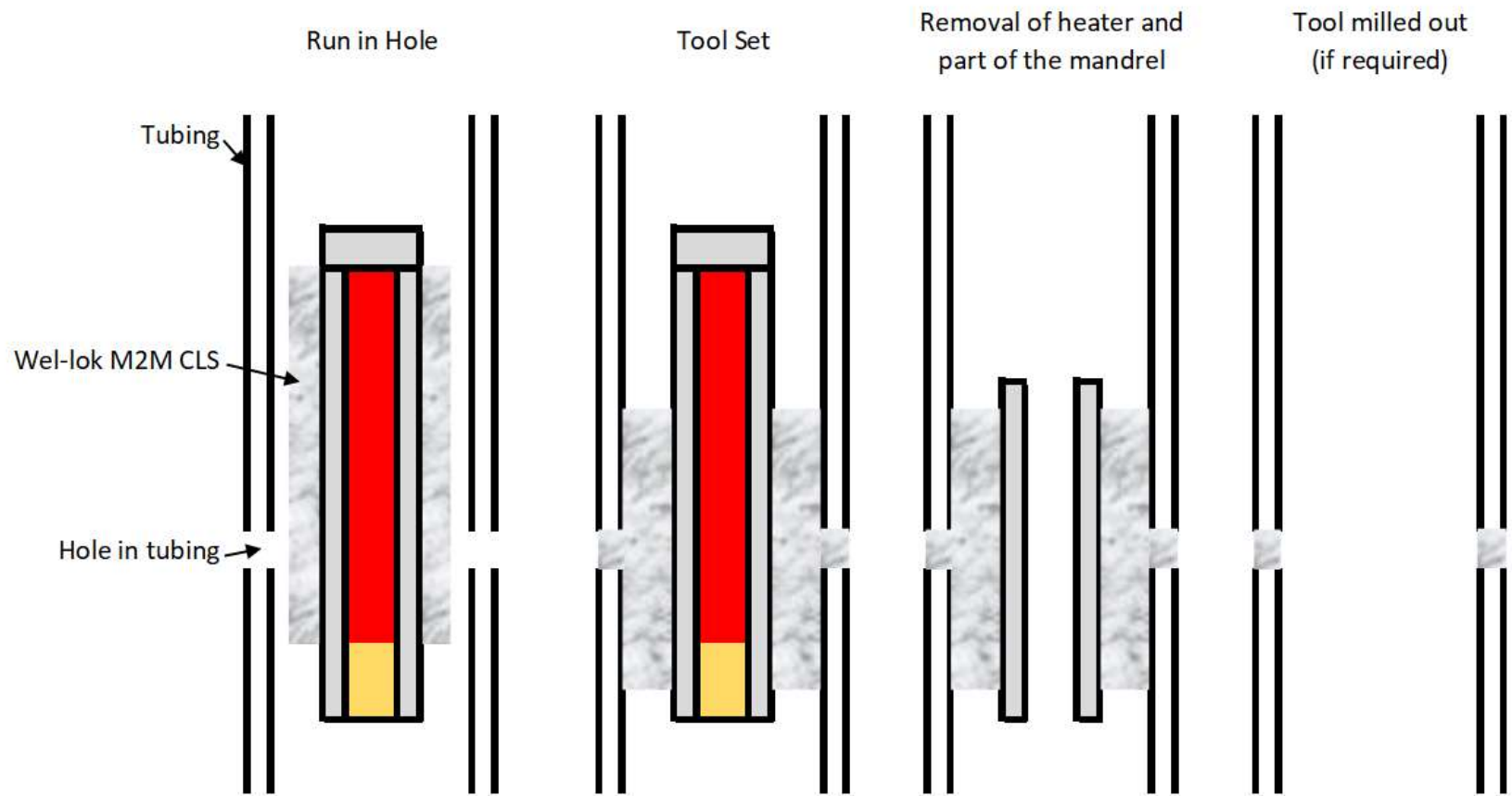


Repairing Holes In Casing/Tubing



- Seals inside a damage casing or tubing
- Can be milled out to achieve full bore ID

Running Sequence



Repairing Leaking Production Packers

- Run inside tubing (tubing perforations required)
- Seals inside tubing and tubing x production casing annulus above a leaking packer
- Seal can be milled out to achieve full bore ID of production tubing



No heat zone to
protect the packer
Build up of cooler
alloy seen

Good well melted
alloy in the annulus &
wellbore creating a perfect
metal to metal seal

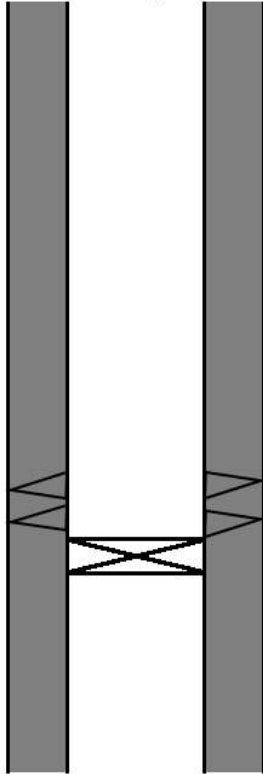
Repairing Poor Cement



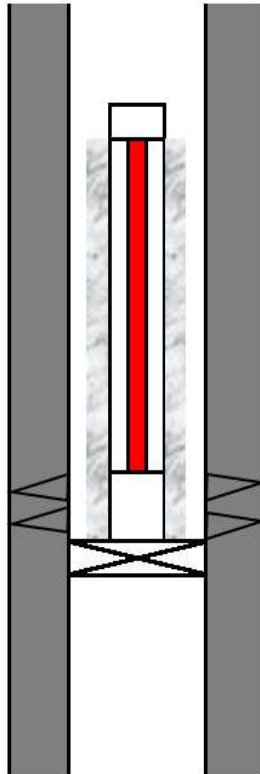
- Run inside casing (casing perforations required)
- Seals off casing x casing annulus to stop gas migration through channeled cement or micro-annuli

Running Sequence

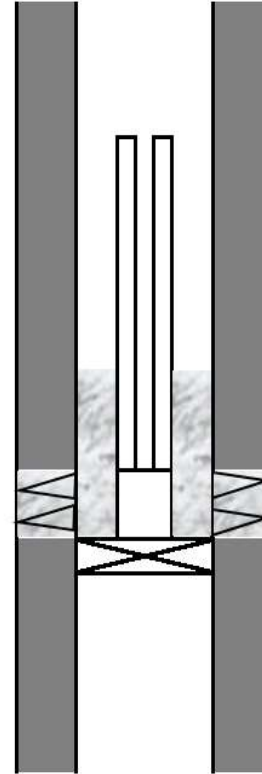
Set base plug and perforate casing



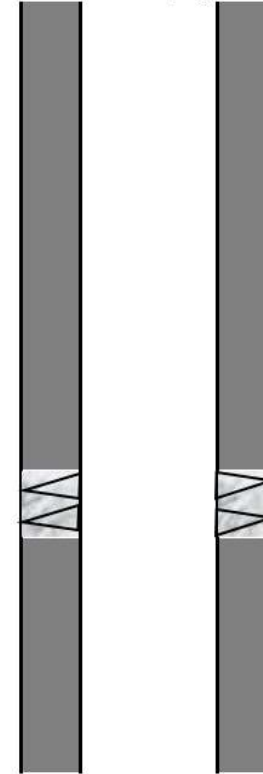
RIH with Wel-lok M2M CRT



Set Wel-lok M2M CRT



Mill out Wel-lok M2M CRT and base plug

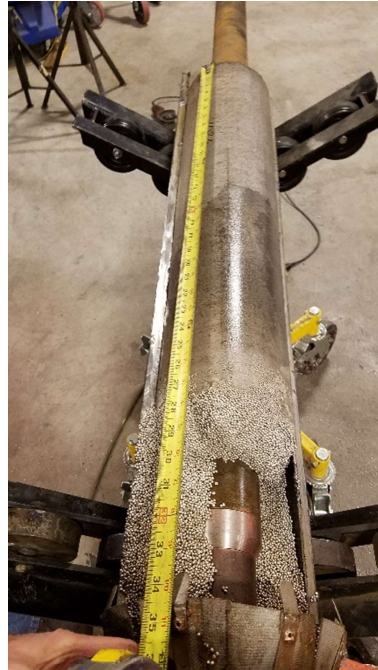


Sealing Cased Hole Perforations



- Alloy will fill and seal perforated holes in formation.
- Note markings 1, 3, 5 & 7 on the photo, these were created in sandstone with a standard perforating gun
- This tool was tested to 2,000 psi after set

Through Tubing Applications



- 2 7/8" OD tool
- Set inside 7" casing
- Pressure and gas tested with helium to 5,000 psi

New Developments for P&A Applications



- 3.5" OD tools setting in 16" ID casing or open hole
- 13 3/8" x 20" STC for surface seals
- Removable heaters for single material barriers



Questions???