



Gas Ignition when Installing a 4m Mega-Bolt



▶ What happened?

A hydraulic bolting rig was being used to install a 4m “Mega-Bolt” into a drill hole at the face of a New Zealand coal mine. Rib support mesh around the collar of the Mega-Bolt hole was left in place prior to inserting the bolt. As the bolt was being spun to mix the point anchor resin, methane from a hole from the coal seam ignited. This resulted in a small flame, which extended from the collar of the hole.

The flame was extinguished using a portable fire extinguisher.

Investigation

The source of the ignition was determined to be the friction of the nut against the plate and helped by the heat generated by friction of the bolt against the mesh.

Recommendations

Hydraulic bolting rigs have the potential to cause ignitions of methane in coal mines. Reduce the chance of frictional heat being generated while installing Mega-Bolts by:

1. Applying water to cool the collar of the hole during installation of 4m Mega-Bolts (for example by using a hand held water hose).
2. When installing 6m, 8m and 11m Mega-Bolts, turn on the flushing water and allow it to flow through the dolly and up the grout tube, then down the hole. This is best practice (manufacturer’s recommendations) for installation to keep grout tubes clear during point anchoring with resin. The water will remove any frictional heat generated. The running water will also aid ventilation by displacing gases into the main ventilation current.
3. Use the drill to control the thrust and the spin to minimise pressure on the plates/washers against the shaft of the bolt. This is intended to lower friction and consequently generate lower heat levels. When the bolt is approximately 100mm from the back of the hole, stop the thrust and continue to mix the resin (spin the bolt). When the resin is nearly finished mixing, stop spinning and re-apply the thrust to push the bolt to the back of the hole.
4. Maintain ventilation standards and good stone-dusting practices.
5. Ensure that Mega-Bolts have a brass washer fitted between the nut and the plate.
6. Always remove mesh from the collar of the hole where there is a risk of contact between it and the shaft of the bolt. This applies to all Mega-Bolts. It is thought that the rubbing action of the bolt on the mesh can cause the mesh strand to heat up like a light bulb filament, thus igniting the gas.

