

FIGHTING FIRE WITH INNOVATION



Kirity Kumar, Quaker Houghton, USA, explains the need for fire resistant hydraulic fluids and their importance within the coal mining industry.

As the coal mining industry continues its quest for enhanced safety measures and environmental consciousness, integrating fire resistant hydraulic fluids is emerging as a pioneering solution with the potential to mitigate fire hazards and elevate operational security to unprecedented heights.

The unyielding threat of fire in coal mines

The coal mining industry has long grappled with the danger of fire hazards. Flammable gases and coal dust are inherent features of these underground environments, creating a volatile cocktail that demands utmost caution. While effective in facilitating machinery operation, traditional hydraulic fluids can inadvertently escalate the fire risk due to their flammable nature. The dangers of catastrophic fires and explosions are ever-present, threatening miners' lives, the integrity of equipment, and the stability of mine structures.

Heavy-duty machines like continuous miners are used to cut through coal seams. Shuttle cars transport the precious cargo amidst confined spaces, and roof bolters secure stability, warding off potential collapses. Load haul

dump (LHD) loaders deftly scoop and transfer coal to conveyors within the pitch-black depths. Yet, the criticality of equipment is the harshness of the surroundings – extreme pressures, high temperatures, moist and dusty air, and the constant risk of fire hazards.

In response, the demand for fire resistant hydraulic fluid becomes vital, as these fluids optimise machinery performance and offer a crucial layer of protection against ignition risks in an environment where a single spark could spell catastrophe. These specialised fluids boast a remarkable quality: high ignition temperatures. Unlike their conventional counterparts, fire resistant fluids are engineered to withstand ignition under the extreme conditions prevalent in coal mines. This inherent resistance reduces the risk of hydraulic fluid-related fires and explosions.

Safety, though paramount, is only one facet of this transformative shift. Coal mines, often nestled in ecologically sensitive regions, can be environmental hotspots due to the risk of spills and leaks from hydraulic systems. While fire resistant hydraulic fluids cannot entirely prevent equipment leakage, their biodegradable nature and



compliance ensure they do not threaten aquatic life. Regulatory compliance is another essential requirement that fire resistant hydraulic fluids address. Mining operations must adhere to strict safety standards to safeguard human lives and the environment. The adoption of fire resistant fluids not only aligns with these standards, but often surpasses them.

Enhancing safety, performance, and sustainability

Commonly employed in room and pillar mining, the prevailing fire-resistant hydraulic fluids are water-free polyol ester products (HFDu). HFDu fluids are widely recognised as the premier fire-resistant option compared to mineral oil, albeit at a higher cost. These fluids are specifically engineered to replace anti-wear hydraulic fluids that rely on mineral oil. This substitution is intended for scenarios where the potential for fire is a concern. Moreover, these fluids possess the versatility to be employed in hydraulic systems that demand environmental consideration. Importantly, their utilisation is consistent with the overall functionality and design of the hydraulic system.

Formulated from premium synthetic organic esters and meticulously chosen additives,



Figure 1. Worker using continuous miner to extract coal underground.



Figure 2. Two mine engineers discussing mining operation.

HFDu fluids are entirely devoid of water, mineral oil, or phosphate ester content. These fluids demonstrate outstanding and consistent hydraulic performance, fostering a dependable operational environment. While cost plays a role in the decision to invest in FRHF, employing such resources usually results in a long-term reduction in ownership expenses and greater added value. This stems from diminished maintenance-related downtime and improved lubrication, curbing energy consumption. Moreover, HFDu products boast an extended fluid lifespan, excel under higher pressure conditions, and elevate the system's overall reliability.

Adopting fire resistant fluids

Adopting fire resistant hydraulic fluids is a global phenomenon, resonating through coal mines across continents. These fluids facilitate a shift towards safer, more efficient, and environmentally responsible mining practices. Whether it is preventing catastrophic fires, reducing equipment wear and tear, or enhancing the industry's image in terms of sustainability, the impact of this transition is profound.

In the quest for safer, more sustainable mining operations, fire resistant hydraulic fluids have emerged as an unsung hero, revolutionising an industry long associated with risks and environmental concerns. As coal mines delve into the future, one thing is clear: this fluid technology is lighting the path to a safer, greener, and more responsible mining industry.

Quaker Houghton leverages over five decades of experience and has applied these advanced fluids across prominent firms in industries spanning steel, aluminium, mining, automotive, and power generation. The company's QUINTOLUBRIC® HFDu range presents water-free, fire-resistant hydraulic fluids. These HFDu fluids are crafted from synthetic and natural polyol esters, boasting high-level fire resistance attributes.

The QUINTOLUBRIC, COSMOLUBRIC®, and QUINTEX® HFDu offerings are engineered to serve as alternatives to anti-wear, mineral oil-based hydraulic fluids in scenarios where fire risks are prevalent. Accessible on a global scale, they embrace biodegradability and find suitability in hydraulic applications that demand an environmentally conscious approach. Notably, HFDu products adhere to the stringent requirements outlined in various Fire Resistant ISO standards and enjoy the endorsement of FM Global (Factory Mutual) approval in numerous instances. 