FLUID POWER JOURNAL

Insider Guide / November 2015

Case Study: HFD-U Fluids Manage Fire Safety in Press-Hardening Equipment

By Quaker Chemical's **Ronald Knecht,** Global Business Development Manager and Global OEM Manager - Fluid Power

Press-hardening operations have all the elements of a fire hazard – hot surfaces (1652°F, 900°C), pressurized mineral oil in the hydraulic systems, and the proximity of the hot surfaces to the pressurized oil. If the oil ignites, it can create a torch-like exploding fire, resulting in significant equipment damage and even the loss of life. Although mineral oil is inexpensive and readily available, it can be present a dangerous fire hazard. A safer, cost-effective hydraulic fluid alternative is available.

Developing a Risk Control Strategy

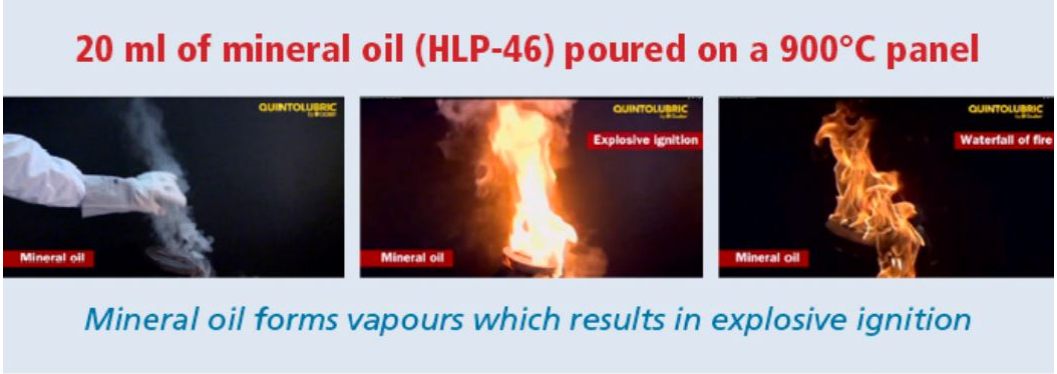
To mitigate the negative effects of fire and explosions on safety and production, many press-hardening operators are taking a fresh look at hydraulic fluids that offer increased fire resistance – water glycols (HFC) and water-free fluids (HFD). As they evaluate alternatives, they will need to consider a wide range of factors, including the cost to convert to a new fluid and the longer-term "total cost of ownership" of the fluid. OEMs and fluid suppliers should be able to help operators evaluate the overall costs/benefits of the conversion to help arrive at the best solution for a company's individual situation.

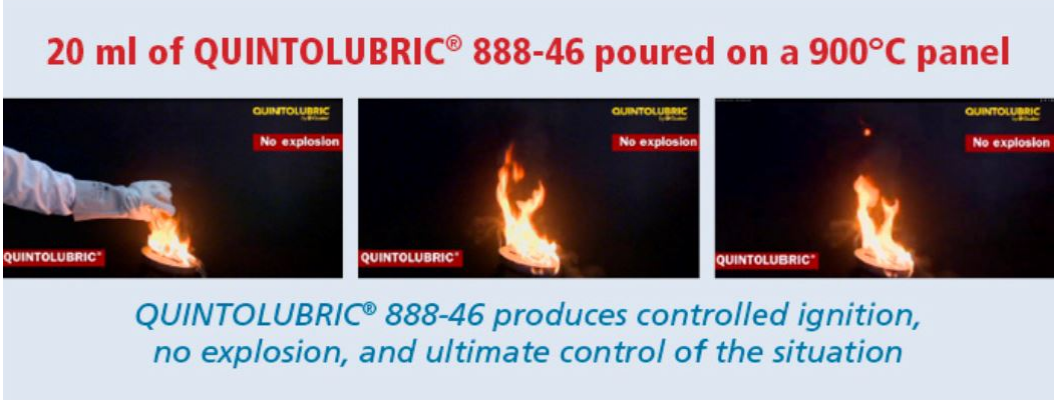
Case History: One Stamping Plant's Risk Assessment Strategy

The press-hardening lines at a large global stamping company had experienced a number of fires that were caused when oil from ruptured hoses and leaking couplings came into contact with hot work surfaces. In 2012, a particularly bad fire resulted in not only 12 days of downtime, but also injury to workers. The company experienced 5.3 million Euros in damages from lost production and repairs. The gravity of the situation convinced management and the board of directors to take immediate action to find a way to reduce the risk of a fire like this from reoccurring. The management team solicited proposals from suppliers and evaluated all the available solutions to identify their best option from both a technical and financial perspective. Their approach weighed all the positives and negatives (*Table 1*).

Management reached the conclusion that the safest and most cost-effective alternative was to replace the mineral oil currently being used in press-hardening operations with a synthetic, water-based, HFD-U fluid. While the fluid costs would be higher than mineral oil, the HFD-U fluid offered the best overall value: improvement to risk and safety without costly equipment changes or increases to maintenance costs.

Quaker Chemical helped the customer implement a six-month trial of QUINTOLUBRIC® 888-46 on a press-hardening line. The conversion went smoothly. Shortly after the hydraulic equipment was running on the fluid, the product was tested under a literal "trial by fire" when a hose ruptured on one of the lines. There was no major damage (*See below*).





Steps to Making a Smooth Conversion

Converting to an HFD-U is not complicated. Even so, press-hardening operators should work with a fluid supplier who has the expertise to offer technical advice to help evaluate situations and who can offer realistic solutions to solve problems ranging from production efficiency to worker safety. Conversion steps should include the following:

- Collecting written approvals from component suppliers
- Conducting extensive, long-term tests to ensure the recommended seals and components are compatible with the fluid
- Defining a specific procedure for a conversion from mineral oil to a synthetic water-free HFD-U fluid (less than 3% mineral oil is expected to remain in the system)
- Running a six-month trial, including regular fluid analysis

The reward is the long-term safety for your facility and your people, knowing you have minimized the hazards created by mineral oil.

Table 1 – Fire Reduction Solutions

SOLUTION	POSITIVE	NEGATIVE	RISK
Change press design to avoid mineral oil leakages close to the hot blank	• Company can keep the same oil technology	• Expensive equipment changes • Construction is complicated and does not solve the problem at the tools	• Reduced risk • Potential for fire and explosions remains as the oil is still close to the blank
Install sprinkler system equipment	• Company can keep the same oil technology	• Expensive to install • Does not prevent explosions • Fire can spread to regions of the plant where sprinkler system is not installed	• Reduced risk of fire • Potential for explosions remains
Change hydraulic fluid to a water glycol HFC-type	• Offers a safer solution	• Expensive to make construction changes • Reduction in lubrication performance and in component life • Corrosion of metal parts, negatively impacts seal life, and can break down under heavy loads	• Low risk of fire due to the presence of water in the fluid
Change hydraulic fluid to a water-free, ester-based HFD-U type	• No investment in changing hydraulic system • Comparable properties to mineral oil-based hydraulic fluid—no impact on seal and hose life	• Initial fluid costs increase over mineral oil-based hydraulic fluids	• Low risk of fire • Situation under control

For more information: Contact Quaker Chemical Corp. at www.quintolubric.com.