

Article

Why **Flat Face couplings** should be your choice in hydraulic hose applications



In this article, **Ronald Molijn** of Danfoss Power Solutions looks at some common problems associated with traditional hydraulic couplings and explores why Flat Face couplings could offer solutions



Introduction

Hydraulic oil is a vital component in many machines around the world. It provides the life blood for operation and the power to get the job done. Therefore, it is essential that hydraulic systems operate efficiently and safely. Traditional couplings that have been utilised for years come with drawbacks such as restricted flow and leakage. OEMs are seeking alternatives in order to improve various factors like operating costs plus machine uptime. However, there is a viable alternative namely Flat Face quick disconnect couplings. In application they can offer significant advantages.

The drive towards more compact equipment, but with higher working pressures

At Danfoss we have seen a trend for increased operating pressures in the region of 400 bar. This is mostly aligned with the OEM trend to offer compact machines, but with the same power and operating capabilities of their larger equivalents.

Essentially, higher pressures mean higher force and torque is available from smaller components. For manufacturers of hydraulic couplings it is not viable to only offer ISO 16028 standard working pressures of 250 bar anymore. This is where Flat Face couplings have an advantage as they are designed for applications that require 400 bar pressures. In my opinion, OEMs should always look to manufacturers who are aligned to current trend in terms of their engineering programme.



The effect of restricted flow on fuel efficiency

With the cost of fuel being high in the 21st century, it is essential to ensure that fuel economy is optimised and maintained. Whilst there are many factors that contribute to the amount of fuel consumed, one area that can dramatically effect a mobile machines performance is hydraulic pressure. Looking at the subject of couplings, it is essential that parts are specified that offer superior flow, in other words let more fluid through. If the coupling is not able to deliver enough flow then the pump for the hydraulic

oil will have to try and compensate. This means that the amount of energy it draws from the ICE (internal combustion engine) is greater, thus the amount of fuel utilised for this compensation is increased. Flat Face couplings that have been engineered to offer greater flow in hydraulic applications can deliver benefits in terms of fuel economy. At Danfoss we are engineering Flat Face couplings to offer increased flow. Engineers have optimised the internal architecture of couplings to ensure that the smooth transition of hydraulic oil through the system is improved. This smooth transition allows for pressure to be maintained at necessary levels, thus negating the need to pump and compensate, which draws more energy. Another important factor is coupling leakage. For a long time this has been an issue within hydraulic systems. If couplings are leaking, the pump will try to compensate for the reduced pressure. Again this means that the pump has to work harder. It draws more power from the ICE and in turn fuel efficiency is affected. The solution here is to utilise leak free couplings.



The effect of leakage on maintenance and uptime

Mobile machines are used all over the world in many different environments and all carry out varied tasks. They all minimise the downtime to ensure a decent return on investment. If a machine is 'out of order' there is a potential risk of missed deadlines and reduced profits. When a traditional coupling leaks, then it will need to be changed. The quicker the machine is back in operation the better. However, with traditional couplings the whole hydraulic system will have to be drained, very much like draining a domestic heating system. If not drained then they are simply placed into a container to 'bleed out'. In my opinion this is where Flat Face quick disconnect couplings have real strength. They can be connected under residual pressure without inclusion of air, due to their dry break feature, thus negating the need to depressurize the entire system. For operators this is perfect as downtime can be minimised by that connection method. The rapid opening also makes the valves more sensitive to changes in temperature, wear, and general mechanically induced friction.



The effect of corrosion

In regions such as Germany and Scandinavia, corroded couplings are simply not acceptable. OEMs spend millions ensuring that their products are cutting edge in terms of performance. However, there can be no doubt that aesthetics play a huge role in brand reputation. If the couplings used are not resistant to rust, then this can negatively impact the OEMs brand image. There is an important underlying message here: The OEM machines can be shipped to many different places around the world and they must be able to cope with the

rigours of the environment. Elements such as water and saltspray (used on treated roads) can wreak havoc on system components causing them to rust if not protected. Eventually rusty components will break down and hydraulic fittings will leak thus causing reliability and maintenance issues. Always ensure that you work with manufacturers that are seeking to provide the ultimate in terms of coatings that can resist corrosion. Danfoss guarantees 1000 hours corrosion resistance against red rust (as tested in a saltspray test lab environment). The engineers from Danfoss are continually looking at ways to innovate within corrosion protection. In addition, we specialise in offering environmentally friendly coatings — good for the machine, great for the environment.



Traditional couplings are prone to dirt ingress when disconnected

Operating environments can present many hazards to equipment and especially hydraulic lines. When disconnected, traditional hydraulic fittings are not sealed to the outside world. Often dust, sand, dirt etc. can be present and if not mitigated for can find their way into hydraulic lines. Contamination in the hydraulic lines is transferred to system components which, over time causes them to fail. Again this is where Flat Face couplings dry break feature has its strength as the risk of ingress into the hydraulic systems can be contained.



Protecting the environment and safeguarding people's health and safety

Flat Face couplings offer dry break or minimum spill performance as required in a broad range of applications where potential fluid leakage is an issue. Indeed, features such as sleeve lock mitigates the risk of accidental disconnection. If couplings leak, people can become exposed to the chemicals

in hydraulic fluids. The exposure to chemicals may be due to inhalation, ingestion, or touch. There are instances of people suffering from skin irritation or weakness in hands while handling hydraulic fluids. There are also cases of intestinal bleeding, pneumonia, or death through hydraulic fluid ingestion though no serious hazards are reported with hydraulic fluid inhalation. Similar to ingestion, fluids can be accidentally injected into the skin as well. This takes place when the high-pressure hydraulic system hose is disconnected and toxic fluids leak out and inject into the skin. Another hazard of hydraulic fluid is that when the hydraulic coupling leaks, the chemicals of the fluids can either stay on top of the soil or sink into the ground. If the chemicals get mixed in a water body, they will sink to the bottom. In fact in such cases, the chemicals can stay there for more than a year. Aquatic life can absorb the toxic hydraulic fluid, leading to illness or death to the animal or anything higher on the food chain.



Conclusion

The traditional hydraulic coupling has been in existence for many years and it has served the industry well. However, 21st century applications are challenging and demand innovation. Thankfully, the Flat Face coupling from Danfoss offers OEMs the ability to meet these challenges head on and enables the OEM to save fuel, minimise downtime, safeguard people, and protect the environment.