varnish Clean Solutions for Hydraulic Oil Technology Needs

液压油油泥清洁技术解决方案

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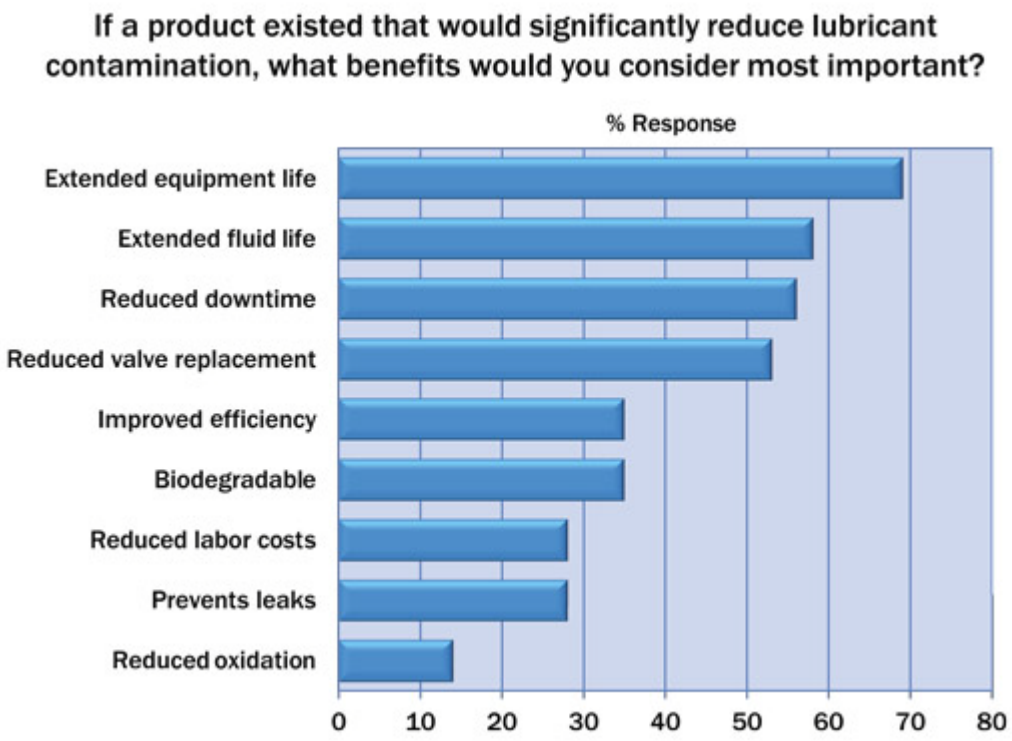
Hydraulic equipment owners and operators expect superior performance from their investment. When it comes to their business, they are looking for the three “E”s: economy, efficiency and environment. As regulatory requirements increase and equipment design changes, hydraulic oil technology must continue to evolve to keep pace. 液压设备的所有者和操作者希望他们的投资得到优越性能。当涉及到他们的工作，他们正在寻找三个“E”：经济，效率和环保。当未知需求的增加和液压设备的设计变化，液压油的技术必须持续发展以跟上。

Developing the right additive technology to meet the industry’s changing needs requires additive suppliers to take into account all the variables - from the expectations for modern equipment and fluids to the possible results of poor oil performance. By obtaining an accurate picture of the hydraulic equipment landscape, additive formulators can deliver the right solutions. 开发合适的添加剂技术，以满足行业的需求的变化要求添加剂供应商考虑所有的变量，从现代设备和差的液体油性能表现的可能结果的期望。通过获得的液压设备的外观一个准确的图片，添加剂的配方可以提供正确的解决方案。

Expectations 期望

Today’s hydraulic machinery works hard. It is expected to be highly reliable with minimum downtime and cost-effective operation. The expectation of a safe working environment also dictates that hydraulic systems operate with low equipment noise. Perhaps the most important expectation is efficiency. Hydraulic systems are expected to deliver responsive and precise movement with maximum efficiency. When valves become stuck or are unable to respond immediately to commands, they can have an impact on operational efficiency and result in costly repairs. 如今的液压设备工作强度大，被期待有高度可靠的最小停机时间和低成本效益的运行。一个安全的工作环境的需求也决定了液压系统设备必须在低噪音下运行，也许最重要的是效率的期望。液压系统被期望提供灵敏和精确的最大效率的运动。当阀被卡住或无法立即响应指令，他们会对运作的效率和成本高昂的维修结果有影响。



As the expectations on hydraulic equipment increase, so do the demands on the hydraulic fluid. Hydraulic fluids are expected to protect the entire system while transferring fluid power efficiently, even as systems become more compact and encounter harsher environments with extreme temperatures. Despite these increased performance requirements, hydraulic fluids are required to last longer while still being cost effective.当对液压设备的期望增加，所以在液压流体上处理这些要求。液压流体将流体输送的电力的同时有效保护整个系统，即使系统变得更加紧凑，遇到恶劣环境极端温度。尽管这些增加的性能要求，液压油必须持续更长的同时保持成本效率。

Equipment Conditions 设备条件

Long considered the workhorse of manufacturing and construction, hydraulic equipment is trusted with delivering the power that moves industry forward. Today, the stakes are high and getting higher. In response to new regulations and the drive for improved efficiency and economy, equipment is changing in ways that have not been seen for decades. 长期以来被认为是制造业和建筑业的主力，液压设备相信是可以促进动力输送移动行业向前发展的。今天，地位越来越高。根据新规定，为提高效率和经济效益的驱动，设备正在几十年来没有看到的方式改变。

For example, the hydraulic system pressure and hydraulic pump power-to-weight ratio continue to increase. Under these conditions, oil temperatures can reach 115 degrees C at the extreme. Other equipment modifications that will have a significant impact on hydraulic fluids include:

例如，液压系统的压力和液压泵的功率重量比继续增加。在这些条件下，油的温度可以达到115℃的极端。其他设备的变动，对液压油将有显着的影响，包括：

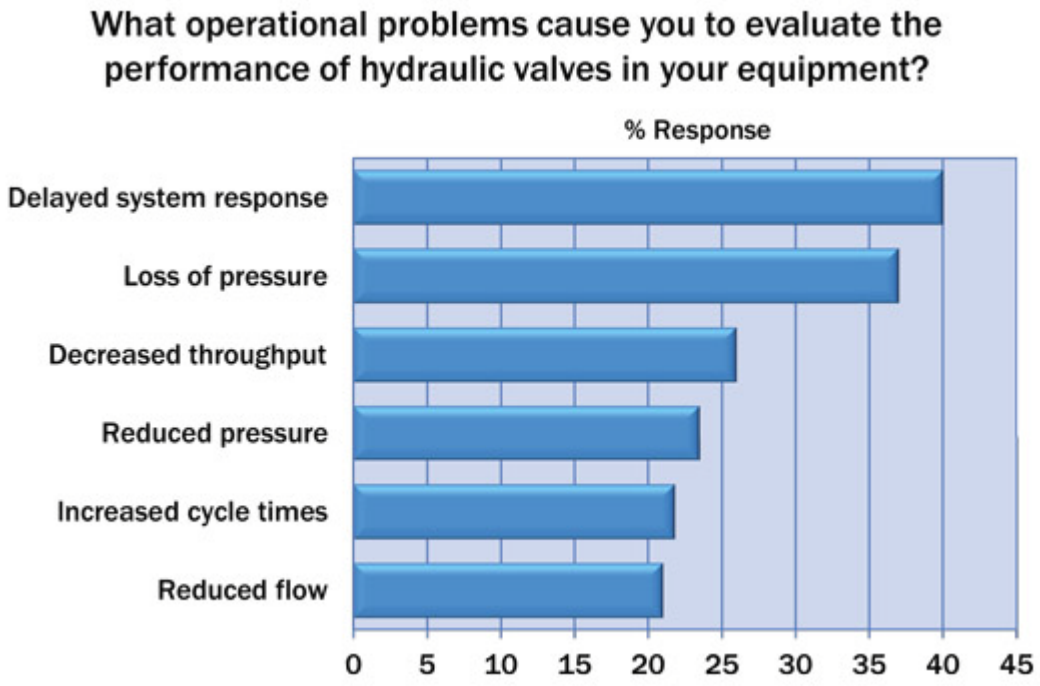
- Servo-electric motors to improve hydraulic system efficiency 伺服马达改善液压系统效率
- Increased hydraulic oil tank turnover 增加液压油箱周转
- Minimized hydraulic system fill volumes 减少液压系统填充量
- Closed-loop hydraulic systems 闭环液压系统

Oil Conditions 油品条件

As is the case with hydraulic equipment, hydraulic oils are also seeing tougher conditions. Higher temperatures are a given, as are higher oil pressures and shear rates. The fluid works much harder and much hotter as it cycles rapidly through the reservoir with less time to cool, release heat and disperse foam. The end result is a tendency to create materials within the system that can cause varnish, ultimately leading to valve sticking. 不只是对液压设备，对液压油也有了更严格的条件，更高的温度下进行，更高的工作压力和剪切速率。流体工作更频繁，更为迅速通过油箱，减少了冷却、释放热量、分散的泡沫的时间。最终的结果是一个趋势，系统会产生一些导致生成油泥的物质，最终导致粘阀。

End-User Research 用户调查

Of course, knowing the issues isn't enough. Only by talking with end users can real needs and problems be identified. A recent survey of end users found three key needs regarding hydraulic fluids: productivity, extended equipment life and reduced downtime. The survey also enabled the identification of the top operational problems end users were experiencing with hydraulic valves. This was further explored to determine which benefits end users considered most important. 当然，知道问题是不够的。只有通过与终端用户交谈可以了解真正的需要和问题确认。最近的一项调查发现最终用户对牵扯到液压流体的三个关键需求：生产效率、延长设备的使用寿命、减少停机时间。调查还使顶部操作问题的最终用户体验的识别与液压阀。这是进一步研究来确定哪些好处是最终用户认为最重要的。



Survey participants included representatives from a number of industries including plastics, government, construction, general manufacturing, waste disposal, civil engineering, specialty production, agriculture, forestry, marine, and oil and gas. 调查的参与者包括来自多个行业包括塑料，政府，建筑，一般制造业，废物处理，土木工程，专业生产，林业，农业，海洋，石油和天然气等行业。

The research revealed that the cost of valve replacement, which is the response to varnish formation, is an important issue for end users. Hydraulic equipment operators, like everyone else, are concerned about economy. In many cases, slow or failed valve actuation means valves are routinely changed or cleaned, which costs time and money. Failure to respond to valve sticking can result in: 研究表明，更换阀的成本，这是油泥形成的影响结果，是最终用户的一个重要问题。液压设备的操作者，和其他人一样，都关心经济性。在许多情况下，动作缓慢或失败的阀门是经常被例行公事的更换或清洗，这是花费时间和金钱的。粘阀故障导致的响应失败可造成以下结果：

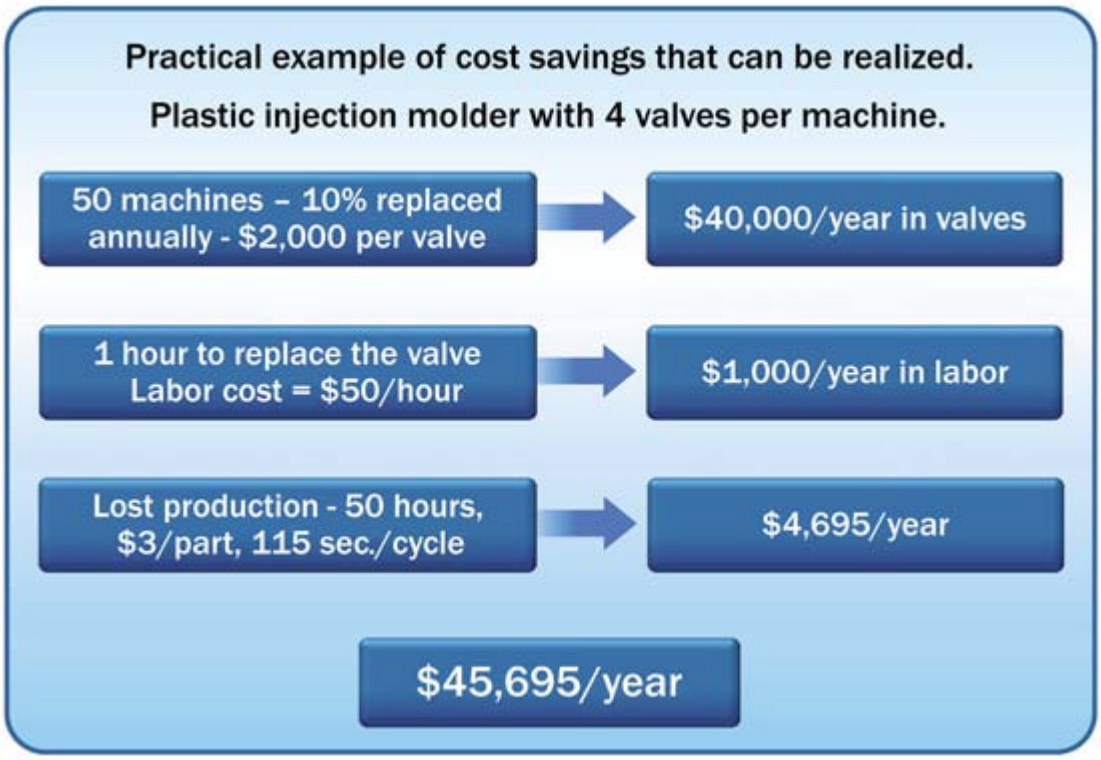
- Decreased production (most operators only respond when slow actuation is obvious)减少产品(大多数操作者只是在动作缓慢比较明显时有所反应)
- Unscheduled downtime 计划外停机
- Increased costs 成本增加
- Safety concerns 安全

Effects (Varnish)影响（油泥）

Varnish occurs as oil ages. In addition to the natural process of additive consumption, hydraulic fluid degrades as a result of oxidation and thermal decomposition. The ideal solution is a hydraulic fluid that does not deposit varnish on surfaces. This would lessen or eliminate the need for valve replacement. Reducing valve sticking not only would improve the operational economics but also help the environment by maintaining operational efficiency and maximizing the use of power. 油泥发生主要来自油品使用时间。除了添加剂消耗的自然过程，液压油性能会降低由于氧化和热分解。理想的解决方案是一个液压流体在表面上不沉积油泥。这将减少或消除阀的更换需要。减少阀芯的粘结将不仅会提高系统运行的经济性也有助于通过维护运行效率来改善环境和最大限度地利用动力。

Following are a few real-world examples of how additive technology that prevents varnish can deliver real cost savings. 以下是几个真实世界中的例子中的添加剂技术，防止油泥可以提供真正的成本节约。

Plastic Injection Molding 塑料注塑机



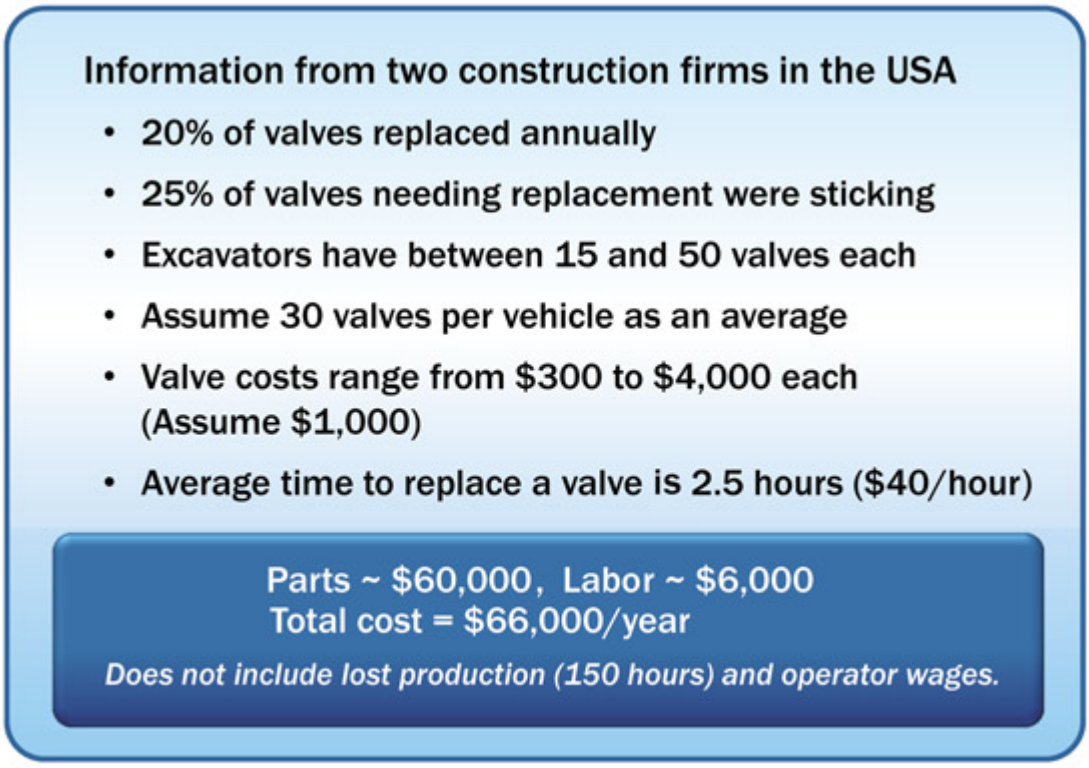
Plastic injection molding is a very common method of mass-producing parts, so when valves stick and hydraulic systems need to be shut down for unscheduled maintenance, there are several impacts on the company's financial bottom line. 塑料注射成型是一种很常见的批量生产零件的方法，所以当阀门卡阻，需要计划外的维护时液压系统要停止，将对公司的成本底线造成不少影响。

In the example above, a plastic injection-molding company with 50 machines (four valves per machine) saw potential savings of $45,695 per year with the right hydraulic oil. 在上面的例子中，一个 50 台机器（每台设备四个阀门）的塑料注塑公司使用合适的液压油潜在的可以每年节约 45695 美元。

Gas Turbine Power Generation 燃气轮机发电

Peaking turbines, which supply power only when demand is high, are another good example of how the right fluid can deliver a better economic result. The presence of varnish can lead to a turbine trip, which means the turbine will not deliver power when needed. The potential cost of a turbine trip can be $5,000 to $120,000. 剧烈增加的涡轮机组，只有当需求高时才供电，另一个例子是如何正确的流体可以提供更好的经济效果。油泥的存在可以导致汽轮机跳闸，这意味着当需要时涡轮机无法提供动力。一种汽轮机跳闸的潜在成本可以 5000 美元到 120000 美元。

Off-Highway Excavators 不能上路的挖掘机



In the construction industry, pulling a piece of equipment out of service to change hydraulic valves can mean a significant loss of time and money. For instance, information from two construction firms showed a total possible cost of $66,000 per year for a 40-excavator fleet resulting from valve replacement.

在建筑行业，拉着一台设备去更换液压阀意味着是时间和金钱的重大损失。例如，从两个施工企业信息显示的每年为一个 40 个挖掘机车队更换液压阀门导致费用成本 66000 美元。

As these examples indicate, the cost of varnish can be high. Reduced efficiency can sometimes go undetected, and by the time this becomes obvious to the user, a significant amount of additional energy may have been consumed with the consequential impact on the environment. 这些例子表明，油泥的代价会很高。效率降低，有时是未被发现的，通过时间变得明显传递给用户，大量额外的能量消耗可能对环境造成影响。

Additive Solutions 添加剂解决方案

Because hydraulic formulations are carefully balanced to meet original equipment manufacturer requirements, adding a new varnish-mitigating feature to the fluid's performance profile requires a unique solution. Fortunately, fluids are now available incorporating additive chemistry that reacts with the precursors to varnish, minimizing the formation of resinous films on system hardware. This clean technology will be a must-have for all industrial fluids. 由于液压油配方精心平衡来满足原始设备制造商的要求，添加一个新的降低油泥的性能配置需要一个独特的解决方案。幸运的是，现在可以在流体里使用在生成油泥前起作用的合成化学添加剂，减少液压系统部件上树脂膜的形成。这种清洁技术将为工业流体必备。

There are also additive systems that can remove varnish once it forms. Both of these options allow equipment owners and operators to optimize their systems to best achieve the three "E"s: economy, efficiency and environment.
这里也有在形成油泥前去除的添加剂系统。这两个选择允许设备所有者和操作者去优化他们的系统以实现三个"E"：经济，效率和环境。