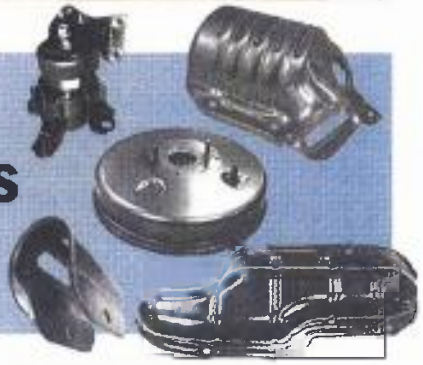
New lube gives the slip to stamper's slips, trips, and falls

Lubricant change improves auto supplier's safety, savings, 'greenness'



KI (USA) stamps and produces subassembly parts for Toyota, Honda, Nissan, and other automotive OEMs. Photo courtesy of KI (USA), Berea, Ky.

KI (USA), Berea, Ky., a division of Keiaisha Co. Ltd. (Japan), stamps and produces subassembly parts for Toyota, Honda, Nissan, and other automotive OEMs (see **lead image**).

Company President Gary Robinson requested that a team from the stamping department improve plant safety by reducing incidents of slips and falls. Petroleum-based stamping lubricants that had been used in the stamping processes created a slippery environment at the press sites and other locations in the plant where parts were transported or handled. The engineering staff examined the lubrication process to look for ways to reduce the slips, trips, and falls (STFs) attributable to the presence of these lubricants.

After conducting research and methodical testing, the group changed the stamping lubricant it used from a petroleum-based lubricant to a synthetic-based lubricant. The change not only improved plant safety, it created cost savings, improved part appearance, and reduced the plant's environmental impact.

Reduce Lubes, Reduce Costs

KI (USA) stamps carbon steels, stainless steel, and aluminum. Each metal creates unique challenges for a lubricant in the stamping process. The diverse characteristics of each metal had required that the company use three different petroleum-based lubricants. In addition to seeking a lubricant that would reduce slips and falls, the company sought to consolidate the number of lubricants it used from three to one that would perform well and cost-effectively with all three metals to reduce costs.

Stainless steel's hardness required that the lubricant provide significant boundary protection to hold up to extreme pressure and the resulting heat from friction. The petroleum-based lubricant that the stamper had used contained significant levels of chlorinated paraffin as an extreme-pressure (EP) additive for these jobs. Theoretically, the same type of lubricant could work well to form the carbon steel parts, but the higher-priced lubricant was too costly for the job. In addition, the waxy residue that it left on parts was undesirable for both welding and cleaning operations. High chlorine content in lubricants can also promote corrosion.

While not a concern for stainless steel, carbon-containing steel must be protected from any effects that could create corrosion. So the stamper used a second lubricant type that contained a lower level of these waxy EP additives for carbon steel.

A third lubricant was used in forming aluminum parts. Aluminum has poor stretch distribution characteristics, so a lubricant must particularly promote controlled metal flow during stamping.

Compared to ferrous steel, the topography of aluminum is very smooth. At a microscopic level, few valleys or pockets exist in which a lubricant can deposit itself. If a lubricant is to work effectively on aluminum, it must be tenacious enough to adhere to a smooth surface. However, aluminum can release dustlike fines during wiping motions or cutoffs. These fines are abrasive and can wear down tooling and create adobelike buildup when mixed with some fluids. The lubricant's tenacity is better promoted through complex chemical manipulation of the product's surface tension to create acceptable sheeting characteristics. A lubricant that contains tacky polymers, fats, or waxes can cause the fines to adhere to tooling or any mechanical operation of the die in which lubricant can collect.

Looking for the Green Lining

Additionally, KI (USA) was interested in using an environmentally friendly lubricant. As part of its effort to reduce costs and lessen the plant's impact on the environment, the stamper recirculates its

Petroleum-based lubricant used

Synthetic lubricant used

Figure 1

The synthetic lubricant deposit on parts quickly evaporates to a near dry-to-the-touch residue (lower photo). As a result, fluid does not drip from part bins as they are transported. The cleaner residue eliminated the oil slicks that had created slips and falls in the plant, as well as minimized disposal costs. Photo courtesy of KI (USA), Berea, Ky.

stamping lubricant. It was important that the lubricant facilitated this process.

Evaluation Process

Engineering Manager Ron White began the project by studying trade literature and online information. From his initial research, White asked four potential lubricant suppliers to assess the press operations and to make recommendations. He reviewed the material safety data sheets (MSDS) for each proposed lubricant to be sure none of them contained ingredients that were restricted in his plant for safety or environmental reasons. He also researched the chemistry and performance of the lubricants and their effect on post-process operations.

White concluded that synthetic lubricants might provide the safety, environmental characteristics, and the versatility needed. His team's research indicated that synthetic lubricants generally do not contain hazardous ingredients, that they are cleaner than petroleum-based lubricants to work with, and they create less hazardous waste to dispose of than petroleum lubricants.

During the next phase of the project, the engineering staff screened each product for basic performance criteria, White said. They reviewed the anticorrosion properties by coating panels with various lubricant dilutions and subjecting them to the plant environment for controlled periods of time. White examined laboratory test data from each supplier regarding coefficient of friction results, studies of their products on panels in humidity cabinets, compatibility in cleaners and paint, and welding results.

Once these qualifying studies were completed, his staff began comparative testing of three suppliers' synthetic lubricants. The group tested each lubricant on the most difficult parts. The group selected MS Fluid Technologies, Indianapolis, Ind., to supply a synthetic lubricant, Eco Draw®.

Petroleum to Synthetic

As a result of the switch from a petroleum-based to a synthetic lubricant, KI (USA) accomplished the following:

- Reduced slips, trips, and falls by 41 percent
- Eliminated hazardous components from sprayed stamping lubricant
- Reduced lubricant drippings from transported parts
- Improved plant appearance
- Consolidated stamping lubricants
- Recycled a water-soluble lubricant
- Reduced friction heat and associated tool wear
- Eliminated flash fires at weld points
- Increased weld tip electrode life
- Decreased glove use
- Eliminated prewash procedures
- Increased paint wash bath life
- Decreased paint defects

Safety Improved

Operators at the press site say that the new lubricant is cleaner to work with than the petroleum-based lubricant, according to White. The lubricant deposit on parts quickly evaporates to a near dry-to-the-touch residue (see **Figure 1**). As a result, fluid does not drip from part bins during transport. In addition, as a result of the lubricant's clean characteristics, the mess on the floor was reduced.

Since changing the lubricant used to Eco Draw, STFs at the facility are 41 percent lower, year-to-date, compared to 2006, White said. "The cleaner, safer workplace motivates the employees and facilitates increased production. It also demonstrates that we value our associates," White said.

Green Achieved

Synthetic lubricants segregate tramp oils, such as hydraulic fluids and mill oils, for easy removal. As a result, overall petroleum waste and its associated disposal cost were minimized.

Cost Savings Realized

One Lube for Three Metals. The stamper can use the synthetic lubricant to stamp both its carbon steel and aluminum parts, and is in the process of transitioning the synthetic technology for its stainless steel products.

Less Heat, Longer Tool Life. Laser heat-gun studies White's staff has conducted show that parts generate about 30 percent less heat from friction in the presses with the new lubricant. Less friction translates into longer tool life.

In welding operations, the petroleum-based lubricant created smoke, sparking, flash fires, and excessive wear on electrodes. The synthetic lubricant does not promote smoke, and the weld tip electrode life has been extended, the company says.

No Prewash. Parts coated with the petroleum lubricant had to be prewashed prior to the paint pretreatment system; otherwise the parts would not get cleaned adequately, resulting in a high reject rate in the paint department. With the synthetic lubricant, parts go directly to the pretreatment system.

No Turning Back

"Even the cleaning bath's useful life has been extended," White said. "If I were to suggest that we change back to petroleum-based lubricants, my paint department would object the loudest."

Ron White is engineering manager at KI (USA), 501 Mayde Road, Berea, KY 40403, 859-986-1420, rwhite@kiusa.com, www.kiusa.com.

MS Fluid Technologies, 2100 Greenbrier Lane, Indianapolis, IN 46218, 800-486-1407, paulhosler@msfluid.com, www.msfluid.com