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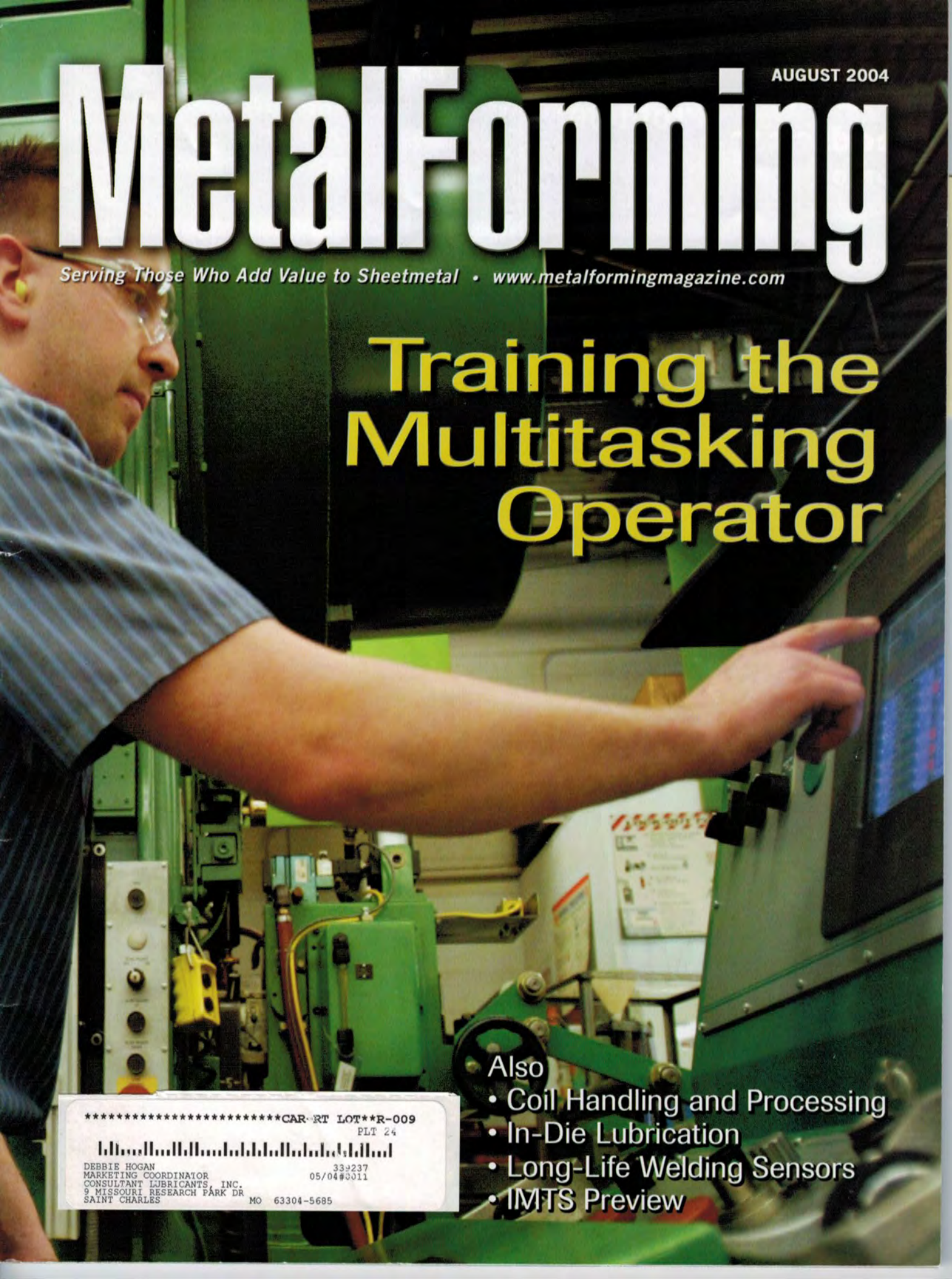

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Give More Thought to Lube

Forming-lube selection and application, often afterthoughts, require more attention if your goals are quality parts, happy customers and profits.

BY LOUIS A. KREN, SENIOR EDITOR

What lube to use when stamping and drawing, and how much to use? Those basic questions require detective work. Tool design and material, part material, line and press equipment, application methods and pre- and post-forming operations all, to varying degrees, affect lube performance. In an era of sophisticated tooling, stringent quality demands, environmental pressures and higher-strength materials, it's high time to put away the paint roller and Mom's dishwashing detergent. Lubrication demands a more concerted approach.

Never too Early to Ask

Often, lubrication is an afterthought, considered only after the job is won, the equipment is installed and the tooling built. Minding lubrication early on in the tool-design process can limit headaches down the road, says Tim Stephens, *MetalForming* columnist and president of die-engineering firm Competitive Action Technologies, Phoenix, AZ.

Stephens is a big believer in a scientific, engineered approach to die design

and construction. In a proper design environment, lubrication should be one of many factors considered.

"Designers should take an engineered approach to lubrication," he says, "but unfortunately it often is an afterthought. Usually, tooling has no provision for lubrication use and delivery, then during tryout or at initial production, lubrication issues often come up. At that point, stampers can elect to modify the tool or select a more appropriate lubricant and delivery system. Ideally, stampers should be proactive, requiring that lubrication capability be built in as a condition for tool buyoff from the build source."

But, Stephens notes conventional wisdom that lube experimentation is easier than engineering a tool with certain material types or surface treatments that assist in lowering the coefficient of friction or cooling the tool and material—or at least simplifying the ability to bring lubricant into the tool.

When tool design hasn't accounted for lubrication, metalformers can take effective steps to reach a proper lube solution.

"When tackling lubrication challenges during tryout or upon production, metalformers should take a scientific approach," says Stephens. "Instead of trial-and error guesswork, identify the characteristics of the lube you are using and determine on an engineering basis why that lube may or may not work. Drill down to the root causes, and tie those into the characteristics of the lube as applied to tool material and geometry. Some metalformers just try another lube at random, but identifying the root causes can lead to proper decisions much faster. Taking this scientific approach and documenting the results lead to a store of knowledge that can be drawn upon over time to predict and rectify lubrication problems."

Better Lube Through Chemistry

With the heat of forming as the catalyst, chemical reactions occur where the die material and coating, the part material and the lubricant interact. Understanding those reactions leads to selection of the proper lubricant for the operation, one that eliminates welding of the part to the various tooling components and the inevitable galling that turns expensive material into scrap. That's the opinion of Mel and Kipp Kohl, president and lubrication specialist, respectively, of Consultant Lubricants, Inc., (CLI) St. Louis, MO, a formulator and compounder of metalworking lubricants, including synthetic stamping and drawing compounds.

But what takes place in the die is only part of the story. The ideal lubricant, they say, will mesh with post-forming operations such as cleaning, finishing, welding, coating and part storage.

"There is more to an operation than stamping," says Mel. "Stampers have to

form the part economically, but what about cleanability and the ability to perform post-forming welding? A good stamping compound can nullify those issues."

To get to the heart of lube problems, CLI often tests current lubricants used by stampers and examines application methods, tooling material, base material and press types as well as coil-handling and post-forming operations. Armed with that information, CLI develops new formulas or adjusts one of nearly 700 in the company's computer database to provide a lubricant tailored for that customer's application.

The right lubricant, applied in the correct amount and the correct location, pays off down the line during part welding or cleaning. That was the case recently at one job-shop stamping facility, supplying parts to a Tier One automotive frame manufacturer. For a decade, the stamper had employed soluble oil in a 13-stage progressive die, manufactured from D2 tool steel with a nitride coating on two deep-draw stations.

"This stamper used a soluble oil with chlorinated paraffins at a four-to-one dilution with water to form automotive suspension parts," recalls Kipp, noting that the parts, formed on an 800-ton Verson mechanical press, were of 0.25-in.-thick cold-rolled type 1060 steel and featured a host of tricky bends, draws and punches. "Oily residue drained into the part baskets and puddled, immersing parts at the bottom of the basket in oil. The parts needed to be washed and then sent for final welding to the frame assembly. The company loaded the parts onto tractor trailers—one or two loads per day—for shipment to two offsite facilities for cleaning."

The stamper wanted to eliminate offsite cleaning and the need for as many as six individual operators to do the job, as manual part preparation was required to counter remaining part residue.

"Costs incorporated into the piece-part included those for complete washing and transportation to and from an offsite facility and then transfer to final assembly where operators applied a chemical by hand," says Kipp. "To eliminate those expensive steps, we examined temperatures within the forming zone, materials and specifics related to the welding operation."

With data in hand, CLI specified a full synthetic compound, its 7901, using the same four-to-one dilution as that for the previous lube, allowing the stamper to form and draw the parts without galling and at the needed press speed of 60 strokes/ min. Spray applicators delivered the needed lube to the proper destinations, with major draw areas targeted for extra application. Use of synthetic compound 7901 negated the need for outside part cleaning and decreased part-preparation cost. Cost savings for the metalformer amounted

to several hundred thousand dollars annually, according to CLI.

Again, savings came through study of the entire chain of production—not just what went on inside the press bed—matching the lube to the process at hand.

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