To improve the stability of the surface quality and provide favorable processing characteristics, steel and iron plates receive an oil coating. The oil protects against corrosion and also serves as a lubricant in rolling and punching processes. Usually, an electrostatic field is used for the oil application in order to create a gap-free oil curtain. The thickness and evenness of the oil application are determined by the amount of oil supplied by the metering pump.

One globally operating manufacturer of oiling machines is Duma Maschinen- und Anlagenbau GmbH based in Duisburg, Germany. A trusted partner to manufacturers of industrial-scale equipment in the iron and steel industry for more than 25 years, the company has long been using servo-controlled drives for its precision axial piston pumps.

“This means that we now have pump speeds from zero to 3,000 rotations per minute available for flow control, which we can operate with very high resolution and control accuracy,” explains Robert Schepers, technical plant manager at Duma. This dosing accuracy, which is significantly higher than that provided by conventional drive technology, enables the company to adhere much more precisely to the target or minimum quantities of oil per square meter of sheet metal.

“The Siemens system components offer us a single-axle servo control with very high quality and sufficient dynamics at a good cost/performance ratio.”

Robert Schepers, Technical Plant Manager, Duma Maschinen- und Anlagenbau GmbH
Furthermore, the necessary safety margins can be greatly reduced, saving oil and decreasing costs.

**Improved processing procedures**

Even more important is an even oil application. Schepers gives an example: “When sheet metal segments are pushed into a press or a punching machine, the positioning accuracy depends greatly on the sliding properties of the oiled sheet metal – segments with a thicker oil coating slide farther on the bedplate than those with a thin oil coating.” Even oil application therefore leads to a more consistent coefficient of friction, better process control, greater yield, and better parts quality. And the costly calculation methods of the industry to estimate the remaining oil thickness based on the storage duration of the coils or sheet-metal plates become easier and more accurate when the oil application shows less variance.

Due to the ramp-like speed processes, for example, during start-up and shutdown of the line, the quantity dosage must be adapted precisely and quickly to the speed of the sheet metal passing through the oiling station. This is why Duma uses servomotors of the Simotics S-1FK7 type and Sinamics S110 frequency converters as drives for the metering pumps. A Simatic S7 with 315-2 DP CPU serves as a control system.

“A single-axle servo control with very high quality and sufficient dynamics is possible at a good cost/performance ratio this way,” explains the technical director. “Furthermore, engineering, commissioning, and service are comparatively simple thanks to the integrated and open system interfaces with drive units, motors, and Simatic S7 control.” For example, for the transmission of the signals of the high-definition engine-speed sensor and the motor monitoring, a single cable joint is sufficient – Drivecliq, an open and standardized serial bus at the drive level that supports electronic ID plates. The control system queries the installed components during the initialization phase of the plant. In normal operation, the PLC compares the drive configuration during run-up with the stored nominal values. This ensures that failures at the drive level or changes in a service are detected immediately.

**Long useful life, global acceptance**

Since the Sinamics S110 frequency converter forms a closed control circuit with the engine speed sensor, it is sufficient to indicate a speed set point calculated for the oil application from the current machine speed and the target quantity. This value is automatically implemented and monitored by the drives. Through this system and also thanks to the support of the nearby Siemens branch in Essen, the machine manufacturer can implement his technological expertise with little software and hardware effort in a robust application suitable for industrial use.

Since the oiling machines are integrated into etching, hot-galvanizing, or inspection lines, they do not need guide rollers or supports. The plants by Duma are contact-free and therefore have a very long useful life. This is why the company prefers to use durable and reliable components. Dependable long-term, globally available support from the electronics supplier is also important. Schepers knows firsthand that a machine equipped with Siemens components is accepted in heavy industry around the world: “We can get replacement parts just as easily and quickly in China or in the United States as in Europe, and the service for the electrical machinery is available worldwide and on short notice even after the warranty has run out. This gives us and the end users security, knowing that shutdowns due to failures can be kept short.”