PRODUCTION RESOURCES INCORPORATED

NEWS

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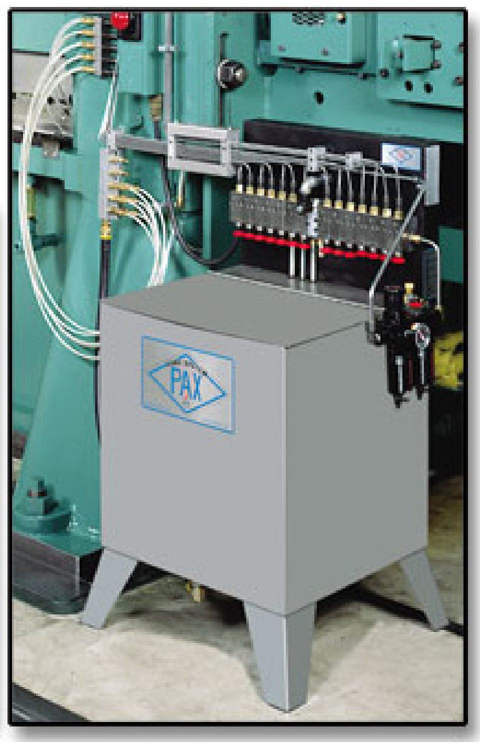
A System Approach To Coil Stock & In-Die Lubrication By Pax Products

Pax Lubrication Systems provide "pressurized" fluid to the spray cabinet and individual spray nozzles. Pax systems are available in pre-pressurized and V-system models. The reservoir/pump/control unit is the heart of the system. It contains the lubricant and delivers it in a controlled fashion to the spray cabinet and individual spray nozzles. Each offers various tank capacity and pump configurations to suit your exact needs. Your PRI Application Engineer can assist you in selecting the model that will best serve your needs.



Pax Lube System

The Lubrication Systems:

- Increase tool life by reducing friction and dissipating heat
- Reduce lubricant consumption
- Improve housekeeping and eliminate the mess by keeping lubricant where it needs to be
- Allow cooler parts for quick handling
- Increase press speeds
- Improve part quality

The Pax spray cabinet is the first element in the lubrication system. It mounts to the press or the feed and applies a controlled amount of lubricant to the top/bottom or both sides of the material as it's fed into the die. Unlike roller coater systems there are no rollers to clean or wear out. Any excess lubricant is captured by the cabinet and returned to the reservoir.

Pax Spray Cabinet

Lubricating the stock through the spray cabinet is effective only in the early stages of the tool. Rewetting in later stations is critical. In-die mounting brackets and nozzles allow precise application of lubricant. Nozzles can be plumbed to a "manifold" to allow for quick disconnect. Individual Pax pumps may also be used to pump lubricant directly to a punch.

Attached Spray Nozzles & Bracket

Understanding In Die Part Quality Measurement

Part 3 of a series

What happens when there's an analog die sensing fault

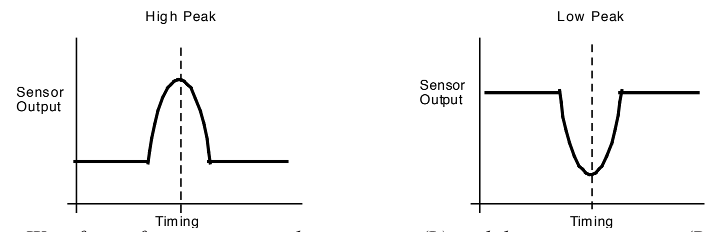
When a control detects an out-of-limits condition, it needs to do something. An analog measurement control system can stop the press as well as take other action. If the fault is not die-threatening, the control can be set to top stop the press. Potentially damaging conditions such as a misfeed, require an emergency stop. More sophisticated control systems also have a variable or "smart" stop that will signal the press to emergency stop if it is safe to do so without risk of the press sticking on bottom, but will automatically switch to top stop if the fault occurs too late in the stroke to stop the press.

For many in-die part measurements, you may not want to stop the press if only one or a few bad parts are detected. Instead you want to divert the bad parts into a scrap bin and keep the press running. You want to stop the press only if it continues to make bad parts. Some control systems allow you to do this by having a sensor input control an output. The output can control a diverter or other device to remove the bad part. Control output timing can be programmed to turn on and off at specific crankshaft angles of the press similar to a programmable limit switch, or can be set to turn at an angle and stay of for a predetermined amount of time.

Simply firing the control output as soon as a sensor detects a fault might not get the job done. For example, if you have a 10 station progressive die, and a measurement sensor in station 7 detects a fault, the bad part will not be available for removal for another three strokes. What is needed is a way to "track" a bad part through the die, and activate the control output when the part is finished. This is known as a "shift register" function. Shift registers delay the actuation of an output for a programmable number of strokes.

Monitoring "peaks"

A common application for in-die measurement sensors is monitoring the die shut height. Sensors can detect small (less that 0.001") changes in die shut height that occur due to pulled slugs, overly thick or hard material, etc. The sensor that is usually selected for this monitoring is the analog proximity sensor. An analog prox sensor detects metallic objects, and changes its output voltage in proportion to the distance from the sensor to the object. Some proximity sensors' output voltage increases as the target object moves closer to the sensor, other sensors have output voltages that decrease as the target moves closer. Waveform plots of sensor output vs. crankshaft angle for each sensor type are shown in the diagram below.



Waveforms from sensors with increasing (L) and decreasing outputs (R)

Shut height, or ram detection results in sensor output signals that have peaks. The ram does not stop moving so there is no sensor dwell time like there would be if the sensors were monitoring something like material feed or stripper height at bottom dead center. To accurately monitor this application, the control needs the ability to detect the peak of the sensor output. Additionally, because a sensor might have a high peak (as in the graph on the left) or a low peak (graph on the right), the control needs to have the ability to detect either. You need to be able to set the control to look for a high peak or a low peak.

Sensor timing

There are some parameters that you will want to monitor at all times regardless of crankshaft position. An example of such an application is bearing temperature monitoring. You would install temperature sensors on the bearings, set a high control limit, and the control system will constantly monitor the sensors and shut the press off if the bearings overheat. There are other applications where you need the control to read the sensors only at a specific time or during a preset timing window.

If you use an analog sensor to measure feed length, you'll want the control to take a reading when the feeder is finished, but before the die closes. If you are measuring the outside length of a drawn part, you want the control to read the sensor when the pilots have aligned the strip, and the stripper plate is holding the part in a sensing station. In both of these applications, the angle where the control reads the sensor is important for taking an accurate measurement. Your control system should allow you to set sensor timing windows, similar to the "ready signals" that die protection systems use.

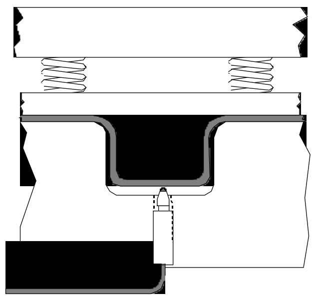
Waveform display

Setting the ready window for a die protection sensor is simply a matter of watching where the sensor turns on and off when the press is running normally, and setting the

(continued on page 3)

(Understanding—Continued from Page 2)

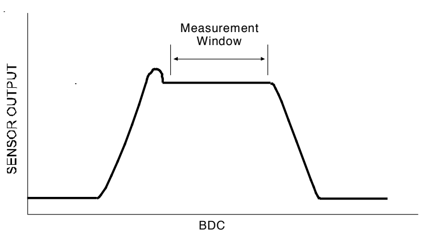
ready window around the sensor actuation angles. Setting the timing window for a measurement sensor is not so easy. An analog measurement sensor does not simply turn on and off. The sensor outputs a constant signal that is proportional to the physical parameter that it is measuring. This is not an on/off signal. Throughout the stroke the sensor signal may have peaks, valleys and jumps. You may only want the control to read the sensor for a very short period of time while the item being measured is in a repeatable location. With a die protection system, you can watch an indicator light to see when a sensor is on. With a measuring system, you need to look at a waveform plot of the sensor's output to ensure that the control is reading the sensor at the right time, and only at the right time. The following example illustrates this need.



LVDT sensor measuring the outside length of a drawn part

The diagram below shows a sensor called an LVDT installed in the bottom die so that it measures the outside length of a drawn part.

We want the control to read this sensor toward the bottom of the stroke, after the pilots align the strip and with the stripper plate holding the part into the sensing station. If we plot the output of this sensor with respect to crankshaft angle, the graph would look like this:



Draw length sensor output from 130° to 230°

The flat area of the waveform near bottom dead center is the correct measuring window for this sensor. The small peak just before the window is caused by the core of the LVDT "bouncing" when the part contacts it. If you were to set the start of the measurement window just a few degrees earlier, this bounce peak would be measured. This would make the measurement inaccurate, the flat represents the length of the part, the peak is just sensor overtravel. By looking at the waveform plot of this sensor's output, we can see the presence of this peak, and can set the timing window so that the control reads the sensor after the peak, when the sensor has stopped bouncing. If the control does not have a waveform display, you must use a tedious trial-and-error method to set the timing, or use an oscilloscope or chart recorder to plot the waveform.

Summary

The following control features will allow you to make more accurate measurements:

- Resolver based control - Allows you to set accurate and reliable timing signals
- On-screen calibration and position offset settings - Enables the control to display measurements in units that make sense.
- Manual and automatic setpoints - Gives you absolute control over dimensional tolerance limits, while allowing you to quickly create accurate setpoints for parameters that are likely to change from job-to-job.
- Ability to monitor both high and low peaks - Lets you use sensors with either increasing or decreasing ouputs.
- Constant and in-window monitoring - Provides the flexibility to measure parts and monitor important process parameters.
- Waveform display - Ensures that the sensor is read at the correct time.

The next installment of this article will deal with a variety of analog sensors and applications. Production Resources can help you with analog die sensing applications for in die quality control. Call your Application Engineer listed on the back page.

(Article content courtesy of Jim Finnerty, Honeywell Wintriss Controls)

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Did You Know?

Pneumatic shaker conveyors are signficantly more expensive to operate than electric shakers! Here's an example:

AIR		VS.	ELECTRIC	
ENTER ELECTRICITY COST ($/KW/HR)	0.08608 $/KW/HR		ENTER ELECTRICITY COST ($/KW/HR)	0.08608 $/KW/HR
ENTER SHAKER CFM DEMAND	3 CFM		SHAKER HP	0.03 HP
ENTER HOURS OF OPERATION PER YEAR	3120 HRS/YEAR		ENTER HOURS OF OPERATION PER YEAR	3120 HRS/YEAR
COST OF OPERATION PER YEAR	$150.26		COST OF OPERATION PER YEAR	$6.01
PERCENT DIFFERENCE = AIR COSTS 2,400% MORE THAN ELECTRIC TO RUN				
Typical air compressor generates 4 cfm per 1 HP 1 HP requires .746 KW				

Calculation formula available from your Application Engineer.

PRODUCTION RESOURCES INCORPORATED

NEWS

COE Introduces "The Next Generation In Transfer Press Feed Systems"

This new "space saving" design fits within a 40' line length requirement. It combines a compact coil line with an oscillating shear press and a blank destacker for processing blanks and coil strip in six unique modes:

- square-cut without rotate,
- trapezoid-cut w/180° rotate,
- trapezoid-cut w/90° rotate,
- coil feeding partial prog to transfer,
- coil feeding progressive die operations, and
- developed shaped blanks by destacker.

All functions are motorized and positioned by the Job Recipe to simplify and speed set-up. Ten fully-networked servo axis' are provided within the system.

PRI
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Steve Connolly—Northern Ohio
Phil Haskins—West Tennessee, Southern Kentucky, Mississippi
Chris Jones—Central and East Tennessee, Georgia, Alabama
Chris McKinnell—Mid-Atlantic States

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Rapid Air Expands Line

Rapid Air expands special capabilities in their affordable line of servo feeds, straighteners, and reels.

- Servo feed cut-to-length system integrated with 5-ton air over oil c-frame press to pierce holes at 50 spm
- Servo feed cut-to-length system with multi-progression programming, indexing table and part collection fixtures for transformer material
- 106D servo with reduction changes to achieve 300spm x .625 feed length x 50 degree window running .060 x 2.0 inch wide copper
- Special RA1512 1500 pound motorized rewind reel for multi-coil rewind including separator plates, fixed center chuck with t-slot to accommodate lifter rail for coil core gripping
- Special parts straightener with ingoing pinch rolls, D2 rollers, extra thickness capacity of .350" to accept non conforming fin parts with ingoing conveyor.

New Wintriss servo feed interface with SmartPAC2 which eliminates keypad and uses SmartPAC hot button keys to perform manual operations.

FYI

Additional technical information is available at no charge on our website: www.production-resources.com. Just click on "OSHA/Safety" or "Tech Information."

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