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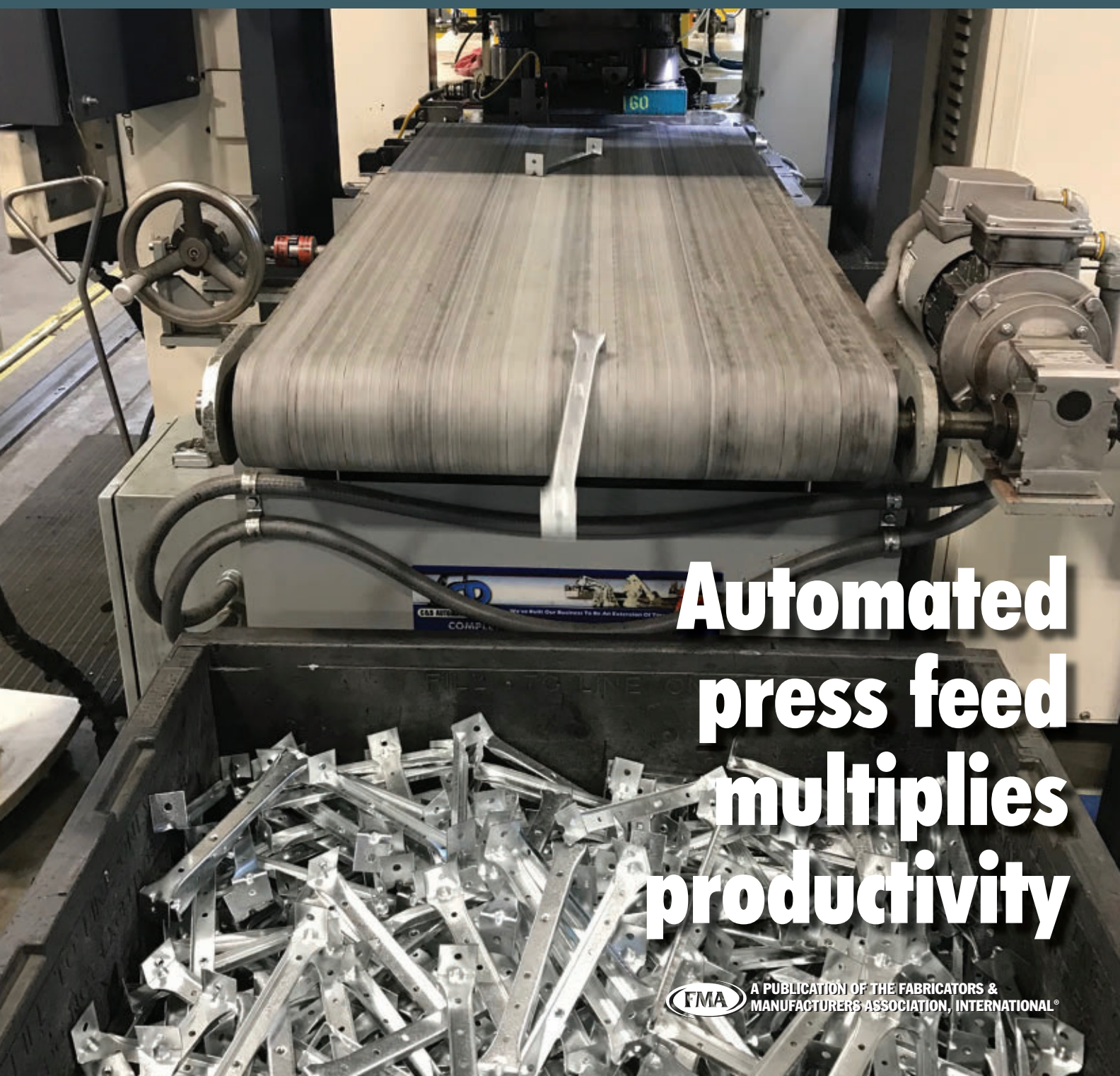

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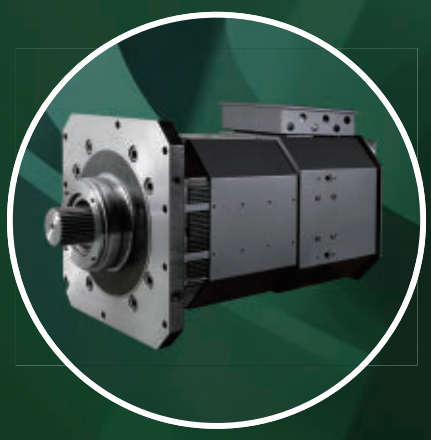

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Kate Bachman
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Countering the consequences of a lingering pandemic

We have to right the ship before we can be underway

As of this writing on July 14, the U.S.'s COVID-19 cases are still spiking while our trading partner countries' cases have dipped and stabilized. The U.S. leads the world in COVID-19 cases and deaths—more than 3 million cases in July with more than 135,000 deaths, according to Johns Hopkins University.

As a result, when the European nations compiled the list of countries they will open their borders to for nonessential travel on July 1, they did not include the U.S. The borders with Canada and Mexico are closed to U.S. visitors as well.

U.S. travelers are banned from entering Europe, Canada, Mexico, and other countries because they deem that we do not have the COVID-19 pandemic under control. These "unwelcome signs" will remain until we do.

Cascading Economic Effects

The ramifications of the closed borders are multiple, hindering international trade exchanges, sourcing, and in-person meetings. It has stalled the intended effects of trade agreements, such as the USMCA, which was scheduled to go into effect in July.

Because tradeshows and conferences often draw exhibitors and attendees globally, the closed borders jeopardize those events. EuroBLECH, originally scheduled for October 2020, has been postponed until March 2021. IMTS 2020 has been canceled altogether. Several other events have been postponed or canceled. These prevent the opportunities for in-person, face-to-face networking, equipment demonstrations, and business exchanges.

The cascading effect is staggering. The dampening of the travel, hospitality, and dining industries has a downstream effect on the demand for metal stampings and fabrications. *The Washington Post* reported that because of the loss of gas tax revenue during the pandemic, states are deferring billions of dollars for transportation projects, lowering demand for metal fabricated structural metal components as a result.

If we needed a reminder that we do business in an interrelated environment and the U.S. is not an island unto itself, this is one.

The pandemic must be brought under control in the U.S. before manufacturing can fully resume.

Demand Drives Profit

Thankfully, most U.S. manufacturers have been allowed to operate during the pandemic as essential businesses; however, that does not alter the demand side of the equation. Consumerism has been crippled.

The unemployment rate, running on average 3.6% until March, skyrocketed to 14.7% in April, descended to 11.1% in June. Though the downward trend is encouraging, the rate is still above recession levels, and it's difficult to discern how much of that employment is artificially boosted by the Paycheck Protection Program.

Despite the push to resume business as usual, an operating-while-pandemic-surges environment will not alter certain undeniable facts. Need I be blunt? Unemployed people cannot buy houses needing metal stamped appliances. Sick people do not fly on airplanes formed with metal. Dead people do not buy cars.

Stamping manufacturers that survived the challenges of 2001 and 2008 have done so by running leaner, faster, and more productively on the plant floor. Yet, no matter how well-engineered your ship, no matter how fortified against high tides, no matter how well-powered, one hole from a jutting iceberg can sink it.

The pandemic must be brought under control in the U.S. before manufacturing can fully resume.

What Can You Do?

Do everything in your power to halt exposure. Operate with all precautions in place. You know what they are—the new 5S: sanitize, social distance, scrub in, send home sick, slip on PPE.

Urge your associates and colleagues to do the same. Advocate to your elected officials to implement practices that will stall the spread of this pandemic.

The sooner we can stamp out the virus, the sooner we can get back to normal—if for no other reason than for the economy. SJ

Got thoughts? I'd love to hear from you. kateb@thefabricator.com

Kate Bachman

Lordstown Motors introduces electric fleet pickup

The Lordstown Motor Co. has introduced the Endurance electric fleet pickup. It features four in-wheel hub motors that provide a maximum output of 600 HP and 2,000 lb.-ft. of torque. Maximum towing capacity is 7,500 lbs. The truck will be built at the former Lordstown Assembly plant, which the startup company purchased from GM in 2019. Production is expected to start in late 2020 or early 2021.

To help stampers learn more about electric vehicles and how the cars' evolution will affect them, Fabricators & Manufacturers Association Intl. will host a one-day conference, "Stamping in an EV World," Sept. 29, 2020, in Ann Arbor, Mich. For more information, visit evstamping.fmanet.org.

AutoGuide opens test center in Massachusetts

AutoGuide Mobile Robots has announced the virtual opening of a test facility in Lawrence, Mass., that will enable visitors to see a variety of modular, high-payload autonomous mobile robots (AMRs) operating in a live environment.

At the test center, in addition to trying out different robots including tuggers and pallet stackers, visitors can test various modules that let the robots be used for different applications targeted at specific challenges. For information on accessing the virtual test center, contact the company's sales team at 978-250-4712 or www.agmobilerobots.com/contact-us.

Ford sets target to become carbon-neutral by 2050

Ford Motor Co. intends to achieve carbon neutrality globally by 2050, while setting interim targets to more urgently address climate change challenges. The company announced this goal as it issued its 21st annual Sustainability Report. To achieve its goal, Ford will focus initially on three areas that account for approximately 95% of its CO_2 emissions: vehicle use, its supply base, and its facilities.

The automaker also is working to develop goals approved and defined by the Science Based Targets initiative for its Scope 1, Scope 2, and Scope 3 emissions. Scope 1 covers direct emissions from company-owned or -controlled sources, while Scope 2 addresses indirect emissions from generation of purchased electricity, steam, heating, and cooling consumed by Ford. Scope 3 emissions speak to in-use emissions from vehicles that it sells and emissions from its supply base, among others.

Ford is investing more than $11.5 billion in electric vehicles through 2022, introducing zero-emission versions of some of its most popular nameplates.

Direct Metals announces ISO 9001:2015 recertification

Direct Metals, an international steel service center with locations in Kennesaw, Ga., and Waukegan, Ill., has been approved for renewal of its ISO 9001:2015 certification.

The company's quality standards extend to its products, warehousing, fabrication, distribution, and customer service.

Stamtec launches expanded Spanish-language website

Stamtec Metal Stamping and Forming Equipment, Manchester, Tenn., has unveiled an expanded Spanish-language website at www.stamtec.com/es, developed for the metal stamping industry in Mexico and Latin America. The revamped website also supports Stamtec's sales, service, and in-stock inventory warehousing facility in Querétaro, Mexico.

The site includes full information on the company's products and support services like maintenance and inspections, replacement parts, and accessories and upgrades.

Olympic Steel opens Georgia facility

Cleveland-based metals service center Olympic Steel Inc. has opened a 120,000-sq.-ft. metal processing facility in Buford, Ga. The location expands the company's southeastern region footprint, which also includes facilities in Locust, N.C.; Winder, Ga.; and Hanceville, Ala.

The Buford facility will act as a flat-rolled fabrication hub, with first-stage metal processing at the Winder facility, metal distribution in the Winder and Hanceville locations, and pipe and tube laser fabrication and bending and welding at the company's Chicago Tube & Iron location in Locust. As part of the expansion, the company also has added a new Mitsubishi fiber-optic laser and a 600-ton Verson stamping press with a Coe coil feed system.

Nidec announces global reorganization

Minster, Ohio-based Nidec Minster has announced organizational changes. A subsidiary of the Nidec Shimpo Corp. based in Kyoto, Japan, Nidec Minster's ongoing acquisition strategy has created the Nidec Press & Automation (NP&A) group of companies, offering metal forming machinery and services.

NP&A includes Nidec Minster; Nidec Arisa in Navarrete, Spain; Nidec Vamco in Pittsburgh; Nidec Kyori in Kyoto; and Nidec SYS in Grafenau, Germany. In addition to shared global manufacturing facilities, NP&A operates customer service centers in Minster; Navarrete; Grafenau; Querétaro, Mexico; Ningbo, China; Peiting, Germany; and São Palo, Brazil.

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FMA COMMUNICATIONS a publication of FMA Communications Inc.

Taiwan Semiconductor Mfg. announces plans to build facility in Arizona

Taiwan Semiconductor Mfg. Co. has announced plans to invest about $12 billion to construct and operate a 5-nm semiconductor production facility in Arizona. According to the company, the facility will be one of only two globally producing these semiconductors.

The facility is expected to create 1,600 high-tech jobs.

More than half of new cars sold in U.S. are 4WD, reports Jato Dynamics

Jato Dynamics, London, has published an infographic that indicates 50.8% of new cars sold in the U.S. as of April 2020 are equipped with either all-wheel drive or four-wheel drive. This is an increase from 39.7% in 2016.

As reported by gmauthority.com, as more all-electric powertrains are employed, the sales percentage for AWD/4WD might increase further since adding electric motors to an electric-vehicle platform is simpler than a mechanical AWD/4WD system.

Beckwood to manufacture 2,500-ton hydraulic press for Diverse Metal Products

St. Louis-based Beckwood Press Co. has been awarded a contract by Diverse Metal Products, Houston, to manufacture a 2,500-ton hydraulic forming press.

Scheduled for delivery later this year, the press will be used to make embossed heat exchanger plates in nuclear missile tubes for the U.S. Navy.

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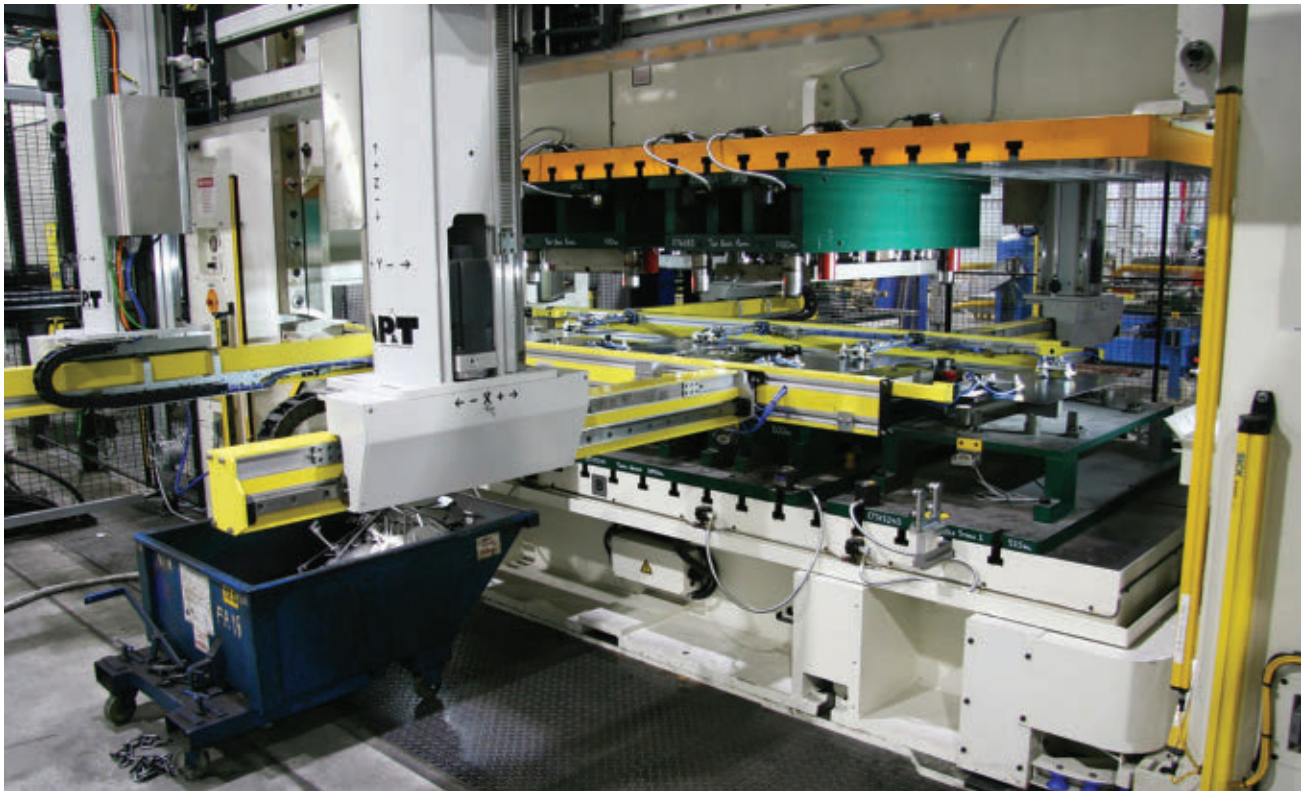

Situation

Ideal Boilers in Hull, U.K., started manufacturing boilers in 1906. More than 400,000 boilers leave the factory every year for households and commercial properties all over the country.

In 2016 the company decided to investigate ways to increase automation and streamline production to meet the growing demand for its products. The goal was to find a partner that could take on full responsibility and supply a turnkey system for fully automated manufacturing of boiler enclosure parts—the parts that surround the boiler itself.

Resolution

After a careful selection process, Ideal Boilers chose AP&T to be its partner in spring 2017. Since November 2018 the boiler chassis for the domestic range of boilers have been manufactured in a fully automatic tandem/transfer line designed by AP&T with two link-motion mechanical presses.

"With the customer's two new link-motion mechanical presses as the starting point, we designed a fully automated tandem line with short setup times and the possibility for fast tool changes," said AP&T Account Manager Christian Wright. "The rate of production has at least doubled compared to previously, when the parts were handled manually. Since it needs to be possible for up to 10 different products to be manufactured in the line during a workday—some formed in both presses, others only in one—achieving an optimized and flexible process was challenging."

The line's two front/back transfers are stable, flexible systems for high-speed feeding into and out of the press, and they enable fast tool changes. All of the automation in the line is synchronized to help ensure an efficient flow. Filling, emptying, and changing transfer beams is fully automated. Two robots stack the formed parts.

"Many of the parts have a complex shape when pressing is complete. This means that stacking must be done with a great deal of precision and without affecting the rate of production," said AP&T Technical Sales Manager Roger Frölander.

The entire process is controlled and monitored by AP&T's control system with the user-friendly LOGOS interface.

In addition to the two-press line, the deal also included automation of an existing mechanical press, which was equipped with a destacker, monobar, and systems for line integration and safety.

"In the project, we were also responsible for purchasing and installing die splitters, which facilitate safe tool handling," said Frölander.

AP&T • aptgroup.com

Shop floor software displays production efficiency data in real time

Wintriss Controls Group offers ShopFloorConnect version 6.0. This OEE and shop floor data collection software collects downtime and production efficiency data from every machine in the manufacturing operation, displays it in real time, and produces manufacturing reports. It identifies and quantifies excessive production losses and bottlenecks to help reduce machine downtime by up to 70%.

The software has a new design format for simplified access to all data. New features include user-friendly reporting and dashboard customization, flexible scheduling capabilities, and machine interface enhancements. For better production analysis, users can improve the OEE of their machines by tracking the reasons for scrap.

Wintriss • www.wintriss.com

Plasma transferred arc welders suitable for repairing stamping dies, tool steel

Castolin Eutectic has introduced two new plasma transferred arc welding machines for automated and manual welding applications, portable or fixed. The EuTronic Gap 2511 DC and EuTronic Gap 5011 DC Synergy are suitable for repair and rebuilding of tool steel, cutting edges, stamping dies, and aluminum die casting molds.

The machines are equipped with an 8.4-in. touchscreen and Remote Manager that allows for remote access and control of the system from a PC or laptop. New process recording software allows constant real-time process monitoring and recording of all welding parameters, which can then be exported to Excel for further analysis.

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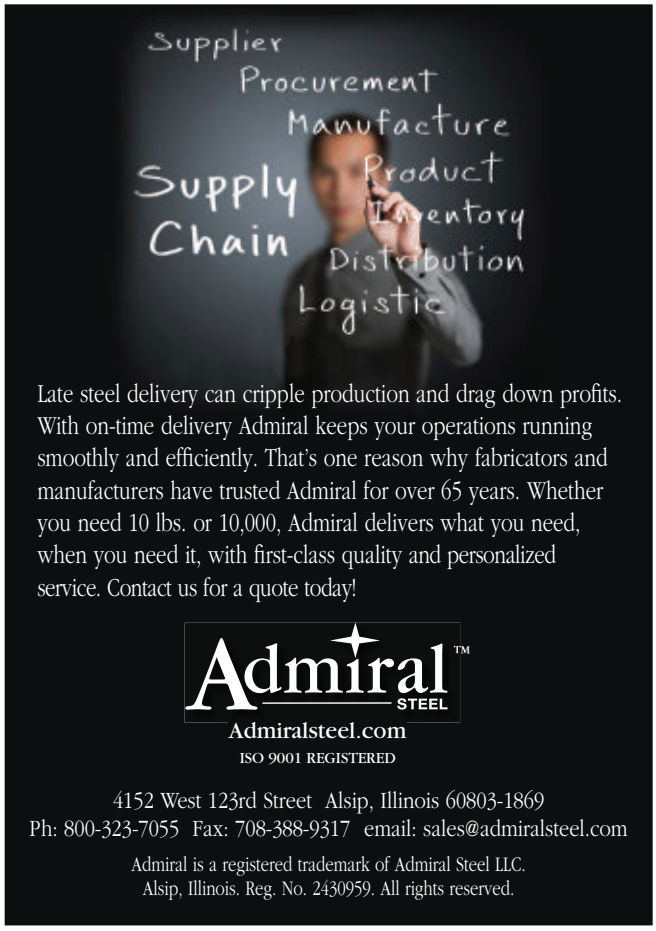

Moving from art to science in diemaking and metal stamping

BY ART HEDRICK

If you have ever attended one of my conferences, no doubt you have heard me get on my soapbox and give my entire spiel about reclassifying the trade of die building and troubleshooting from an art form to a science. It's my passion. As a professional consultant, I have no use for art in the building, designing, and troubleshooting of a stamping die or process. make you feel good, bad, depressed, and a plethora of emotions. It often is a thing of beauty. It often is a product of a combination of creativity and emotion.

So that being stated, would you rather build a die that is cosmetically beautiful and incapable of making a satisfactory part, or an ugly die that runs flawlessly? Keep in mind that the function of a die is to produce parts that can be sold for profit. A chrome-plated die that doesn't work is nothing more than an expensive boat anchor.

Experience plus a comprehensive understanding of die physics is what makes a good diemaker.

The Diemaker's Mindset

I love talking to diemakers, designers, and tooling engineers. On occasion I will walk into a die shop or stamping plant, approach a person working on a die, and—assuming he or she does not recognize me—ask what that person does for a living. The worker often responds, "I'm a diemaker."

Pretending to know nothing about dies or metal stamping, I typically ask what a diemaker does. Often somewhere in the lengthy explanation, I will hear these words: "Diemaking is an art form. One must be an artist to be a good diemaker." That's followed by a description of all the trial and error required for success. Then I thank the worker for spending the time to talk with me, and I walk away somewhat disappointed.

Art Versus Science

For those who firmly believe that diemaking is an art form, may I respectfully pose the following question? Have you ever shimmed, ground, or polished a tool steel section based on an inspiration you had earlier that morning? Have you ever made a press shut height adjustment based on the way it made you feel? After all, at least as I understand it, art is a craft intended to inspire emotion. Art can

Diemaker Versus Dieologist

More than 20 years ago I named my company Dieology for an important reason. I was retaught later in my career that to be a good diemaker, I would have to lose the notion that it is an art form and begin looking at the trade as a science. I had to stop finding solutions based on my experience and start making decisions based on data and facts that I learned during my experience.

My mentor once told me this: "Experience alone is not evidence of true knowledge. I know a lot of toolmakers with 30 years of experience who are still making the same poor decisions and doing the same dumb stuff today as they did 29 years ago. Experience plus a comprehensive understanding of die physics is what makes a good diemaker."

I believe this to be true. I've even coined a new trade name for a diemaker with experience and comprehensive knowledge: dieologist.

The Difference

I don't mean to stereotype or categorize individuals, but based on my observations over the last 40 years of my career, here are a few main differences between diemakers and dieologists.

Diemakers choose actions because they worked last time, often not truly understanding the physics behind the actions. They make decisions based on what more experienced toolmakers taught them ("I learned the trade from an old German diemaker and he said ….") and because things have "always been done that way." Out of desperation, diemakers rely on trial and error based on little evidence.

Dieologists make decisions based on a comprehensive understanding of sheet metal physics and mechanical knowledge. They understand *why* it works. They realize they were taught to do things in a given way for a reason and take the time to understand the physics behind the theory. Through this process they often discover that one rule rarely applies to all situations, and they offer new and improved methods based on data to support change. Dieologists collect and study the data to form a hypothesis. Whenever practical, they conduct experiments carefully to determine corrective action or the most efficient process. They carefully record all data and study their failures to learn from them.

I don't mean to pick on diemakers. After all, I am one. But when my mentor told me that I didn't know what I didn't know, he was dead on. Individuals who spend a great deal of time studying the physics behind dies and sheet metal stamping know without a doubt that it is a highly complex and everchanging career path. It is a professional career path, equivalent to many careers requiring a master's or doctorate degree.

If you're a diemaker, be proud. But remember, pride works best alongside humility. Elevate your trade—become a dieologist.

Until next time … best of luck!

Art Hedrick is president and senior consultant of Dieology, 10855 Simpson West Private, Greenville, MI 48838, 616-894-6855, dieology@pathwaynet.com, www.dieology.com.

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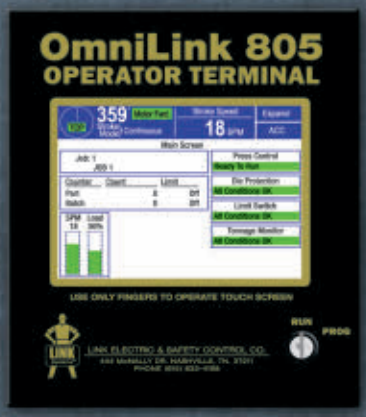

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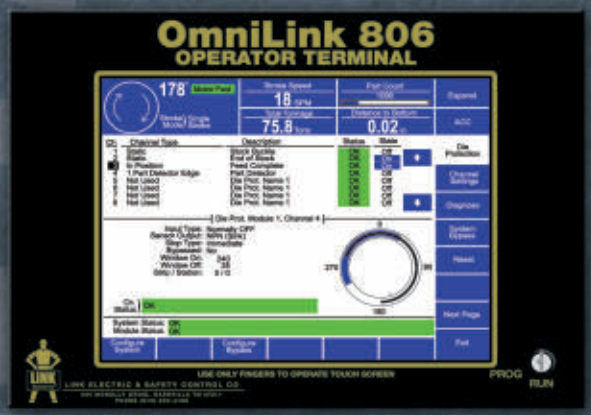

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Evaluating the formability of tailor welded blanks, Part II

Plane strain loading and viscous pressure bulge test

BY HITANSH SINGHAL, ALI FALLAHIAREZOODAR, AND DR. TAYLAN ALTAN

With this column, we say goodbye to Dr. Taylan Altan, who has provided the R&D Update column and overseen his students' research behind it for two decades. Dr. Altan is stepping back to actually retire, since he officially retired in 2012.

As I have gleaned over the years, Dr. Altan is one of the most well-known and respected industry leaders in the stamping industry. As a professor and teacher, research lead, conference host, and outspoken influencer, his knowledge of and passion for the metal forming industry has inspired and excited students and readers alike, and even driven technology changes.

We have been fortunate to have Dr. Altan with us all these years. Dr. Altan, goodbye and thank you!

—Editor Kate Bachman

Editor's note: This is Part II of a two-part series that discusses the methodology for evaluating the formability of tailor welded blanks using finite element (FE) simulations of plane strain and hydraulic bulge tests. Part I, which appeared in the May/June 2020 issue, discussed evaluating the formability of tailor welded blanks using tensile test experiments and FE simulations.

The forming limit diagram (FLD) is the most commonly used failure limit criterion in sheet metal forming to assess formability. A conventional FLD represents the location of the necked or fractured area of sheet metal in a plane of principal strains, $\varepsilon_1 - \varepsilon_2$, where ε_1 is the major strain and ε_2 is the minor strain. The locus of the forming limit, called the forming limit curve, is affected by many factors, such as forming speed, lubricant condition, sheet thickness, strain hardening, and sheet metal anisotropy. Comparing some points in the FLD of monolithic (base) material and tailor welded blanks (TWB) can provide an estimate of the variation in formability (based on the FLD) of TWB as compared to monolithic material (see **Figure 1**).

Plane Strain

Researchers at The Ohio State University's Center for Precision Forming conducted a study to determine the variation (from monolithic to TWB) in the major strain (at necking) in plane strain loading (point 2 in Figure 1). They determined the input material parameters for FE simulations of TWB using tensile tests (see **Figure 2**). The sheet was 1.2 mm thick. To conduct the FE simulations, they used DEFORM-2D software, which uses brick elements. The schematic of the plane strain test setup for FE simulation is shown in **Figure 3**.

They calculated the variation of maximum thinning with stroke and identified the stroke at necking, in FE simula-

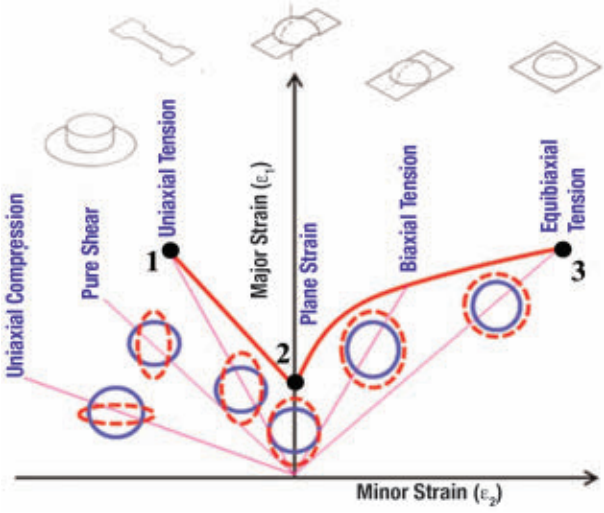
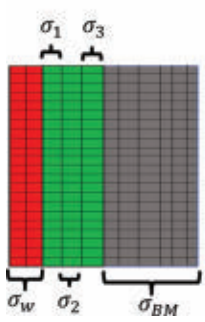


Figure 1

Shown is a schematic of a typical forming limit diagram.



Weld Zone | Heat-affected Zone

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σ_w (constant)	370 MPa
σ_1 (constant)	366 MPa
σ_2 (constant)	362 MPa
σ_3 (constant)	359 MPa
σ_{BM} (power law)	$\sigma = 492.6\varepsilon^{0.225}$ $\bar{r} = 1.61$

Figure 2

Researchers determined the input material parameters for finite element simulations of tailor welded blanks using tensile tests.

tions, as the stroke at which the thinning increases significantly. The stroke, maximum thinning, and the major strain at necking for monolithic and TWB are shown in **Figure 4**.

The stroke did not seem to differ significantly, as most of the load in TWB was taken by the base material. Researchers observed a 22% drop in maximum thinning and 11% drop in major strain at necking. The drop in major strain at necking can be visualized as the drop of point 2 in FLD of monolithic material to obtain point 2 in the FLD of TWB.

Viscous Pressure (Hydraulic) Bulge Test

The researchers also conducted a study to determine the variation (from monolithic to TWB) in the major and minor strains (at necking) in biaxial loading (point 3 in the FLD, Figure 1). The input material parameters for FE simulations of TWB are shown in Figure 2. They used PAM-STAMP, which uses shell elements, to conduct the FE simulations of the viscous pressure (hydraulic) bulge (VPB) test (see **Figure 5**). Bulge pressure as a function of time (see **Figure 6**) was obtained as an output of VPB test experiments. This variation of bulge pressure with time was used as an input in FE simulations.

Results

The researchers determined that in FE simulations, the bulge pressure at necking for the VPB test was the bulge pressure at which thinning increases significantly, similar to plane strain. The bulge pressure, bulge height, maximum thinning, and major and minor strains at necking for monolithic and TWB are shown in **Figure 7**.

The bulge pressure at necking is similar for monolithic and TWB, as most of the deformation occurs in base/monolithic material for TWB, but the bulge height differs significantly, as the harder weld in TWB restricts the increase in height at the center of dome.

Because the weld zone is harder than the base material, there is a significant difference between maximum thinning

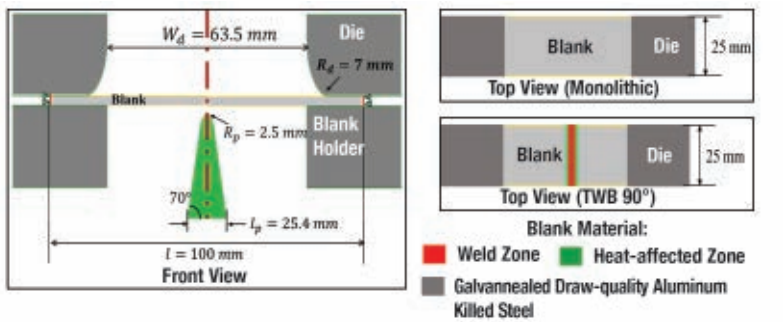

Figure 3

This is the finite element model for plane strain loading.

Material	Stroke at Necking	Maximum Thinning at Necking (%)	Major Strain at Necking (%)
Monolithic	16.5	24	45
TWB 90°	17	19	40

Figure 4

Finite element simulation of monolithic material and TWB brought the following results.

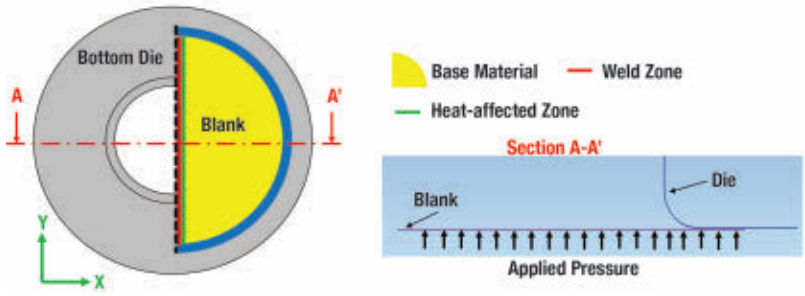

Figure 5

The researchers used PAM-STAMP to conduct the FE simulations of the viscous pressure (hydraulic) bulge test.

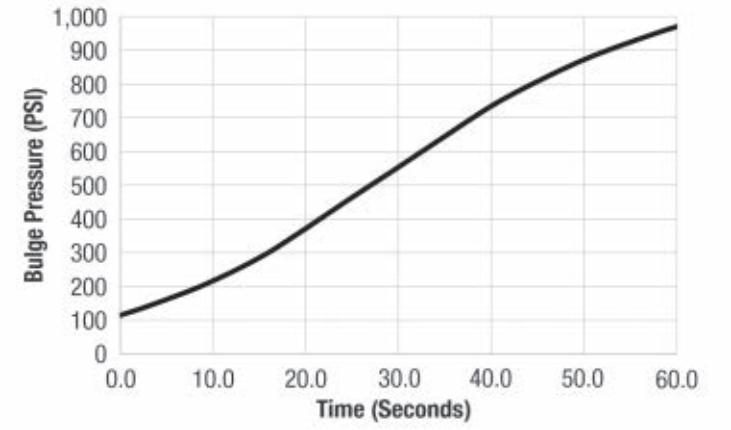

Figure 6

Bulge pressure as a function of time was obtained as an output of viscous pressure (hydraulic) bulge test experiments.

Material	Bulge Pressure at Necking (MPa)	Bulge Height at Necking (mm)	Maximum Thinning (%)	Major Strain (%)	Minor Strain (%)
Monolithic	6.8	66	45	32	31
TWB	7.1	45	26	26	15

Figure 7

The researchers determined that in finite element simulations, the bulge pressure at necking for the viscous pressure (hydraulic) bulge test was the bulge pressure at which thinning increases significantly, similar to plane strain.

at necking for monolithic and TWB. In monolithic material, maximum thinning is at the center of dome; in TWB, it is in the base material, adjacent to the heat-affected zone.

The major and minor strains for monolithic material are similar at necking, which implies a biaxial loading condition. The minor strain at necking is significantly lower than major strain at necking for TWB, which implies that the VPB test for TWB is more like a plane strain loading. Therefore, the reduction from monolithic to TWB is more significant in minor strain (about 50%) than in major strain (about 19%). These results suggest that the drop from monolithic to TWB of point 3 in FLD (see Figure 1) cannot be determined using existing biaxial loading tests. Thus, to investigate the behavior of TWB in biaxial loading, a new test needs to be devised.

Ali Fallahiarezoodar is an advanced engineer at Shiloh Industries. Hitansh Singhal is a graduate student and Dr. Taylan Altan is emeritus professor and director of the Center for Precision Forming (CPF), The Ohio State University, 339 Baker Systems, 1971 Neil Ave., Columbus, OH 43210, 614-292-9267, cpf.osu.edu. *The authors would like to thank former CPF researchers Advaith Narayanan and Berk Aykas for their support and assistance with the project, and Shiloh Industries for providing the test equipment.*

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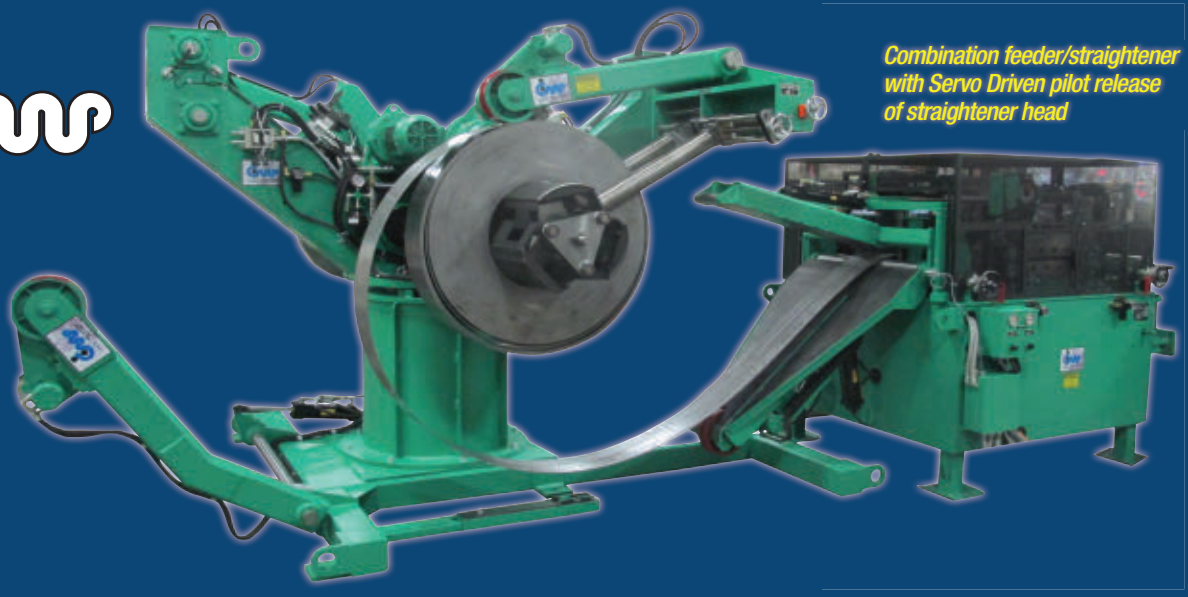

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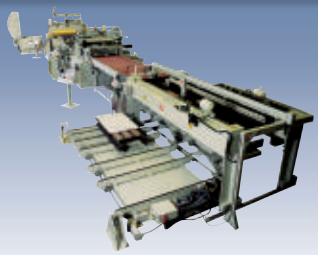

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NEXT-GEN STAMPING LUBRICANTS

advance health, safety, environmental goals

Can HSE be met without diminishing performance, rising costs?

By Chris Fletcher

Health and safety have been of primary concern in 2020 for obvious reasons. COVID-19 and the resulting "new normal" have brought a new appreciation for living and breathing.

As stamping manufacturers progress through this pandemic and beyond, there has been a rejuvenated focus on health and safety. And why not? Isn't keeping everyone safe and healthy a primary focus of any company? Channeling that motivation can help metal formers improve the health, safety, and environmental (HSE) aspects of their processes by the lubricants they use.

LUBRICANTS AND PERFORMANCE, TOOL LIFE, COST

There are many facets to metal forming lubrication, including operational hazards, performance, tool life, cleaning operations, disposal, and, of course, cost. Questions arise—especially in today's health-conscious climate, about safety and performance in operations involving lubrication. Can lubricants be safer without diminishing performance and rising costs? Are HSE alternatives applicable for the growing use of aluminum and new high-strength steels?

The answers to all of these are yes. Following are some examples of ways to introduce HSE lubricants without losing performance.

VANISHING OILS AND VOCS

A stamping manufacturer switched from using a VOC-containing vanishing oil on a finished cargo restraint device to a VOC-free, HSE-safe lubricant in its stamping process.

Many stamping operations still use solvent-based vanishing oils. They are the standard for a clean part, no residue, no stickiness in the die, and perhaps a dry part going into a finished container. The caveat is that these products contain a volatile organic compound (VOC), which is hazardous to operators and the environment.

Reducing and eliminating VOCs in a process by substituting them with non-VOC products has been a goal of many shops over the years. In some cases, a lubricant that can be diluted with water can be used. However, typical dilutions cannot meet all requirements of the process, such as dry parts, no residue, and optimal performance.

However, several stampers are using a non-VOC, undiluted vanishing lubricant designed to dry just as fast as a solvent-based vanishing oil and leave little or no residue on the part. This eliminates the hazardous component while still meeting the fundamental needs of the process. Special consideration is given to the entire process, including stamping performance, flat stacking of parts (when applicable), and dwell time from production to use.

HAZARDOUS VERSUS NONHAZARDOUS: A ONE-FOR-ONE SWITCH

Another case of a hazardous operation involved a stamping company using a synthetic stamping lubricant to produce automotive stampings. The company launched an HSE initiative, which became more urgent when operators began experiencing dermatitis.

An investigation revealed that the lubricant had been identified as toxic on the SDS with an exploding heart pictogram and specific warnings of serious eye damage, carcinogenicity, and targeted organ failure with repeated exposure.

Switching to a next-generation, nonhazardous, pictogram-free synthetic lubricant reduced the toxicity exposure and eliminated the dermatitis immediately. The nontoxic lubricant also was able to improve performance by reducing tool wear and improving part quality without additional cost. Operators were very happy and appreciative that their health and safety were paramount in this decision.

PERFORMANCE AND CHLORINATED PARAFFINS

Chlorinated paraffins, an ingredient in straight, soluble, and vanishing fluids, have been targeted because of their accumulated effect and some harm fish, animals, humans, and the environment. Image courtesy of www.fuelsandlubes.com.

In the past many safer fluids meant a loss of performance and a higher cost. Today that's not the case. Newer technology and additives are safer than ever before. They are highly engineered to maintain performance. Yes, generally, there is a cost to doing so. But the value in increased performance and safety that these products provide usually justifies the initial cost increase and decreases overall process costs.

One such replacement is the elimination of a chlorinated paraffin (CP) straight or soluble oil with a chlorine-free soluble oil. It was once thought impossible to eliminate CPs and attain good performance. The prevailing opinion was that soluble oils had to contain very large amounts of CP and other, more toxic ingredients to keep up good performance. That increased risks to the HSE.

CPs have been a major topic of conversation for many years. The EPA has targeted medium-chain chlorinated paraffins (MCCP) and long-chain chlorinated paraffins (LCCP), barring the manufacture and use of them because of their persistent bioaccumulation in the environment. That initiative was put on a five-year hold to gather more data and validity to the claim, but it will certainly be discussed and pursued again soon.

However, even in the initial claim, the EPA stated that very long-chain chlorinated paraffins (vLCCP) did not have the same bioaccumulation properties. Therefore, they were given a Chemical Abstracts Service registry number, permitting them to be produced, and are being used in metalworking fluids today instead of the medium- and long-chain versions.

The use of vLCCPs is one step in the right direction of improving HSE, but that's not stopping manufacturers from seeking newer and environmentally safer alternatives so that CPs can be eliminated from metalworking fluids altogether. It is a tough task; the extreme-pressure and barrier additives have been used for decades because of their ability to cover the temperature gradient most stamping processes operate in. Today this goal can be met in many processes and varied materials.

CHLORINE-FREE FLUID ON STEEL

A stamping company was able to match the performance of a CP straight oil on a 4-mm-thick, heavy-gauge-steel bearing hub using a vLCCP soluble oil. The goal was simply to reduce cost through dilution, be CP-compliant in the future, and maintain performance. At a 4-to-1 dilution, that goal was met.

A stamping company was able to match the performance of a CP straight oil on a 4-mm-thick, heavy-gauge-steel bearing hub using a vLCCP soluble oil.

Fast-forward. Today's next-generation lubricants are furthering those endeavors with chlorine-free soluble oils. Initial friction, bench scale, and field tests revealed that this newer technology's performance was comparable to the tried-and-true CP soluble oil.

The use of chlorine-free soluble oils on the same heavy-gauge-steel bearing hub netted a better result than the company had originally anticipated. Because the new alternative product was already chlorine-free and hazard-free, the company set new goals to further reduce its impact on HSE and improve overall rust protection on stored parts. Goals accomplished.

In addition, a matching 4-to-1 dilution allowed the stamper to extend the number of runs with less galling and reduced part temperatures—which in turn decreased tool wear and downtime. Continuous improvement of HSE and performance led to a 20% overall cost reduction on the manufacture of that part.

CLEANABILITY AND ALUMINUM

In a similar case involving a straight oil and a deep-drawn, 0.055-in.-thick 5XXX

A stamper was trying to reduce splitting and cracking while also improving the cleanability of 5XXX series aluminum housing parts using a next-gen, HSE-focused soluble oil.

series aluminum housing, a stamper was trying to reduce splitting and cracking while improving the cleanability of the parts using a soluble oil. Even though the parts underwent an aggressive washing process, the company still had not been able to produce the desired level of cleanliness with a higher-performing straight oil.

Previous lubricant trials had shown that while many soluble oil alternatives met the cleanability goal at a higher dilution, they didn't exceed or even match the performance of the straight oil.

The introduction of a different HSE-focused, next-generation soluble oil at a 4-to-1 dilution eliminated splitting in the process *and* achieved the desired cleaning specification.

As a bonus, using the new lubricant reduced the volume needed and accompanying costs and eliminated clogged sprayer nozzles. Of course, it offered a better HSE condition for the company and its employees.

MATCHING EXTREME-PRESSURE CHARACTERISTICS ON AHSS, UHSS

Similar focus can be applied to tribulations used to form advanced high-strength steels (AHSS) and stainless steels. In fact, many of these newer fluids

A CP soluble oil used on a 0.100-in.-thick 5XXX series aluminum automotive part created welding problems downstream.

are taking the lead on formability. Armed with state-of-the-art additives that are conducive to the higher temperatures and friction that these materials generate, new soluble oils and synthetics continue to provide good boundary lubrication as well as extreme-pressure characteristics.

Many stampers would like to use one lubricant on multiple substrates. In

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one case, a manufacturer was stamping new automotive parts out of 0.100-in.-thick 5XXX series aluminum and medium-gauge 3XX series stainless steel. The CP soluble oil it was using on the aluminum created welding problems downstream. The medium-duty synthetic oil used on the stampings did not prevent scoring and tool wear on the stainless steel.

Both the CP soluble oil and medium-duty synthetic oil incurred process performance problems. One also had negative HSE implications. Because a safe synthetic was already being used on all the other stampings, an HSE-friendly soluble oil was chosen to help provide better lubricity to both substrates and to improve the process.

The next-generation slip, boundary, and extreme-pressure additives filled the performance gap on the stainless and provided extended dilution potential for the aluminum part to solve the downstream welding problems.

Most importantly, the company was able to solve its issues without relaxing its commitment to HSE safe lubricants.

STAY SAFE IN A CHANGING WORLD

When trying to improve HSE in your processes, look at newer lubricant technologies that use state-of-the-art ingredients. These alternatives to older standards offer like performance. Look to eliminate solvents and CPs when possible.

New soluble oil and synthetic lubricant technologies can have a positive impact on the entire process by reducing HSE concerns for operator safety, cleanability, and compliant disposal. Look for pictogram-free products. Although metal forming processes will continue to change in today's new normal, the heightened focus on safety should not. In the end, you may find that increasing your HSE may decrease your process costs.

Chris Fletcher is sales and marketing manager for Tower Metalworking Fluids, 4300 S. Tripp Ave., No. 4319, Chicago, IL 60632, 773-927-6161, www.towermwf.com.

Greenheck Fan. Co. installed a Dallas Industries automated feed line for its new servo press to improve changeover time from job to job. Photo courtesy of Greenheck Fan Co.

Air movement equipment manufacturer advances with servo press system

Part II: Automated press feed simplifies, shortens setup

By Kate Bachman

Editor's Note: This article is Part II of a two-part article. To learn more about the press, read Part I in the May/June issue of STAMPING Journal.

Greenheck Fan Co., Schofield, Wis., is one of the largest industrial and commercial HVAC suppliers in the world. Its global footprint includes manufacturing plants throughout the U.S., a location in Mexico, and another in India.

The company manufactures hundreds of SKUs, with air movement equipment ranging from fans, louvers, and dampers to ventilators, circulators, and energy recovery systems. There is a

lot of variety within each product type, too. Fans range in size from 12 by 12 by 4 in. to 12 ft. tall by 10 ft. by 6 ft.

The large number of products equates to a large number of press changes, according to Manufacturing Engineer Tom Franke.

The nature of fanmaking means frequent material changes as well. "Our blades are made of anything from just a 5052 aluminum to a 3000 aluminum to hot-rolled steel, cold-rolled steel, and even galvanized steel. And then we run a few that are stainless as well."

Greenheck Fan Co. has placed a major focus on lean manufacturing, Franke said. "So, we're trying to be as lean as possible," he said.

To help meet the challenges of frequent job changeovers on the press while striving for a lean operation, Greenheck installed something new for the pressroom—a servo press with a fully automated feed line.

The goal was to have a system that could produce small batches of parts to minimize inventory while reducing changeover from one part run to the next to support the company's lean manufacturing goals.

"We wanted a machine system that would allow an operator to walk up to it, hit a button, and everything would move to where it needed to go," Franke said.

Greenheck relied on supplier BDC Machinery to specify, integrate, and coordinate installation of a SEYI SD1-220 servo press system with fully automated material handling.

"After a thorough review of production requirements with the focus on lean manufacturing, we determined that the press alone would not help the company achieve its lean goals, and that an automated feed line was required, BDC Machinery President Rick Wenzel said.

Automated Coil, Press Feed

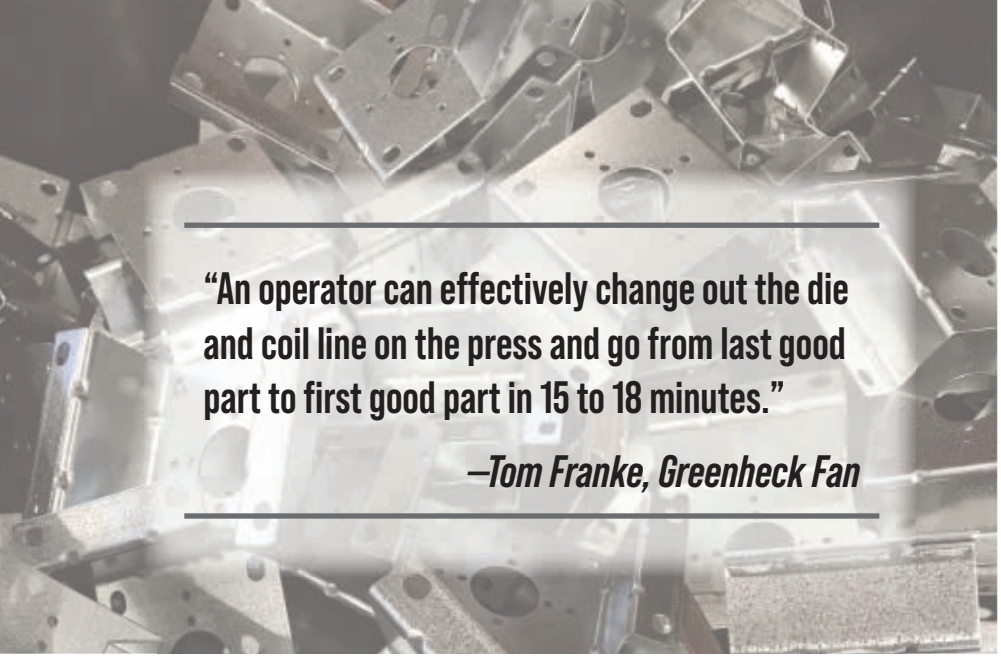
A Dallas Industries automated feed line was installed for the new press.

When a job number is selected at the press control, it is then transmitted to

Greenheck equipment breathes life into COVID-19 battle

Greenheck Fan Co. has been supporting the fight against the coronavirus pandemic on two fronts—by manufacturing ventilation equipment for hospitals and temporary hospitals and supplying data centers that have experienced high volumes because of the work-from-home phenomenon with air cooling equipment. Orders for hospital ventilation machinery are fast-tracked through the plant.

The large number of products Greenheck stamps and materials it uses on short runs equate to a large number of press changes. Photo courtesy of Greenheck Fan Co.



> **"An operator can effectively change out the die and coil line on the press and go from last good part to first good part in 15 to 18 minutes."**
>
> ***—Tom Franke, Greenheck Fan***

the feed line control. That is fairly standard; however, then all critical adjustments required for each type of material or job selected, such as brake tension, straightener roll adjustment, vertical guides, feed length, roll pressure, and passline height, are all completed from the control within 90 seconds or less, according to Wenzel.

Franke said that everything from the roll guides to the leveling table to the tailout mode is automated. Basically, every setting is controlled off the controller rather than being manually controlled. "The only manual movement we have on the line is our pilot height. The operator loads the coil, strings it through, and it runs," Franke said.

"So on a typical machine, you have to *manually* go change the roll feed guides, *manually* change the straightener roll, where now we run in auto mode.

"So as that final strip is coming through the feed system, we'll put it into tailout mode." Franke said that allows the operator already to be loading coil for the next job. As soon as that material is through the straightener and feeder and into the press, it's automatically setting up for the next job.

"At that point we're already moving our cabinet height to where it needs to be for the next die. Our feed speeds, our roll pressures, those are already being adjusted. So rather than manually having to do everything on the feed line, it's all automated to a point where the operator just needs to pull the strip out, demagnetize the die, bring the cart over, and swap it out. It's incredibly fast compared to a standard system."

Franke said that on a similarly sized mechanical press with manual setup, it takes half hour to 40 minutes to set up.

The rapid changeover time is critical, he said. It is no longer typical to have long runs that last a day or two. The pressroom is changing over the press for different products about 10 to 15 times a day during a three-shift operation. Franke added, "We're running for two or three hours on one job and then we're swapping over to a new die."

Dallas Industries CEO Willie Chacko described the automated material handling options (see **Figure 1**).

"The feed guides, near and far, are in place at various locations to guide the material through straight into the press. The control auto adjusts for the size of the coil, the thickness of the material, and the end of the material," Chacko said.

Auto Setup

Chacko cited three efficiencies that the auto setup is designed to deliver.

1. Fast Changeover. Chacko said the auto setup results in a very fast changeover. "So when they're ready for a job changeover, the operator selects the job, hits 'start auto setup,' and the coil feed changes from the previous position to the new position of the next job in about one minute."

2. Repeatability. Chacko said that the second important aspect of auto setup is repeatability. "Once the machine setup is exactly what had previously been stored, it doesn't matter who loads it; it will always be set up the same." The system has password-protected parameters so that when an operator loads the job, the machine sets up to those parameters every time. "The repeatable aspect is very important," he said.

Figure 1

When a job number is selected at the press control, it is then transmitted to the feed line control. Critical adjustments required for each type of material or job selected, such as brake tension, straightener roll adjustment, vertical guides, feed length, roll pressure, and passline height, can be executed from the control. Photo to courtesy of Greenheck Fan Co. Screenshot image courtesy of Dallas Industries.

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3. Simplified Material Loading. The third aspect is ease of loading the material. "When they set up a job, the machine sets up automatically to guide the coil all the way. The strip moves relatively easily through the straightener onto the prep table and into the die.

"Loading the strip from the coil to the press is much easier because the machine is already positioned where it should be."

Communication

In addition to the automatic setup, the coil feed must communicate in sync with the press.

SEYI's standard control was adaptable for the communication needed with auxiliary equipment to complete the cell. The press OEM provided communication protocols that facilitated the ability to access and update the machine control remotely once it was in place on Greenheck's plant floor. The control was also able to perform all process monitoring required without the need to add additional aftermarket process controls, according to Wenzel.

"What that does is when the operator does a job changeover, he or she gets information as to which job is running next over Ethernet," Wenzel said. The operator does not have to be at the controller to select the job. The controller finds the job in the feed system and loads it up automatically. "That prevents an error if somebody loads job A on one side and loads job B on the other side."

Quick Die Change, Magnetic Die Clamping

All of the company's presses have quick die changeover, but the new press's die locating and die holding system is magnetic. The magnetic die clamping system and Greenheck's two-station die cart facilitated a quick die change system that can be completed in minutes.

"This not only saves time, it also reduces the need for highly skilled and high-cost labor. Once combined with quick die change and appropriate part-out conveyance, the system is able to perform hit-to-hit times in as little as a quarter of an hour," Wenzel said.

Once the machine setup is exactly what had previously been stored, it doesn't matter who loads it; it will always be set up the same. Photo courtesy of Greenheck Fan Co.

"The magnetic clamping was one of the unique features we added," Franke said. "We customized the bolster so that the magnets fit around the scrap slots. We can drop all our scrap through the bottom onto a conveyor underneath rather than transferring it onto a shaker conveyor out the back. That was a big bonus that we hadn't had in the past. That was really unique to this machine."

Because the opening was large, limited space was available for the magnets. To overcome this challenge, the system provider, EAS, installed its LP Press-mag system with high holding forces.

The quick die change system includes rolling bolsters and a die cart that allow operators to preload a die.

"Now, with our automated press feed and magnetic die change system, an operator can effectively change out the die and coil line on the press and go from last good part to first good part in 15 to 18 minutes," Franke added. SJ

Editor Kate Bachman can be reached at kateb@thefabricator.com.

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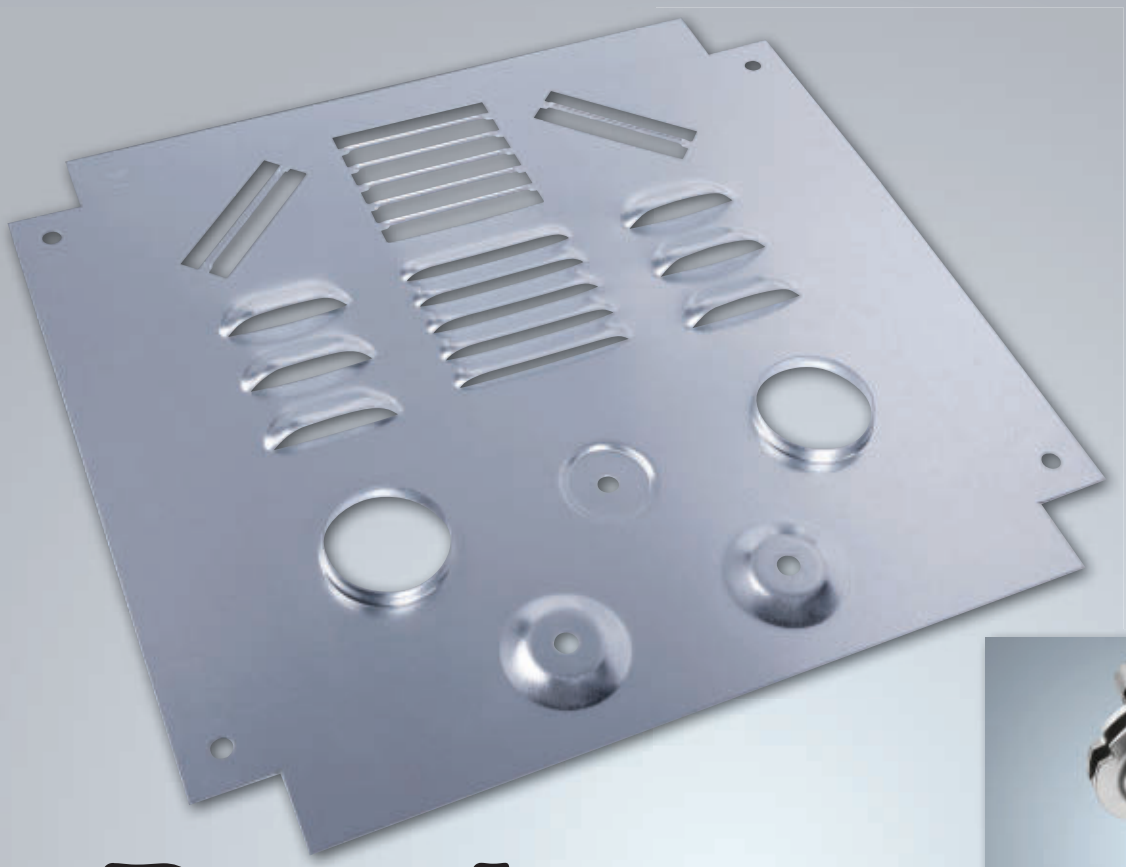


Punch technology

can be adaptive alternative to stamping

Flexibility, versatility in the toolbox

Some forms such as louvers and holes can be punched on a punch/laser machine. With a ball deburring tool, you can deburr small, complex holes and corners and large contours on workpieces.

By Roger Michaud

There is no denying a stamping press's ability to mass-produce large quantities of parts in a time-efficient manner. Stamping is a "sure-thing" approach that shop owners and plant managers have relied on successfully for large-run consistency.

But in the ever-changing world of manufacturing, the market constantly requires more customization, continuous improvement, design changes, and smaller production batches than before.

If there is anything consistent about manufacturing, it is that manufacturers are always looking for the most cost-effective ways to improve operations, whether it be by reducing scrap, reducing downtime, making tooling last longer, improving work flow, or enhancing operator training. In addition, their customers are demanding versatility and flexibility.

Fortunately, a punch or punch/laser combination machine offers a way to respond to the challenges.

Punch Machines Pack a Punch

With a variety of standard and customizable tools, a punch machine meets the requirement for very specific hole sizes, tolerances, and form heights. A stamper can order a custom tool to make the specific part that its customer is looking for. The tooling ordering process is quite simple. A punch tooling supplier would first need a 3D drawing of the part to view the heights and sizes needed to

form it. Many punch tool suppliers keep standard tools in stock. Custom tools can take up to two weeks to build.

A linear-style punch machine, unlike the turret-style punch machine, is designed to make it easy to add or remove custom tools at any time. That ability is suitable for small-batch runs, testing, and measuring. Having the capability to remove tools simply maximizes tool sharpening quality and efficiency. It also frees up valuable space on the machine while it is running other programs. You can just upload a program, load the material, verify that the proper tooling is on the rail, and press "play."

Linear punch machines can be efficient as well. They are built with a direct connection between the punching tool and the head; no springs are used in this machine. Because 100% of the machine's punching force is applied to the raw material, its energy is not wasted through the spring.

A punch machine can be equipped with tools that form, shear, nibble, tap, bend, and mark, creating a finished product fast and efficiently and reducing the overall work flow. In some cases, a punch or punch/laser combination machine may be able to process a workpiece completely.

Roller Deburring. With proper tooling, postproduction can become obsolete. For instance, a roller deburring tool produces burr-free sheet metal parts, thereby eliminating or reducing the need to grind or remove burrs. This accelerates throughput time considerably, and the improved edge quality lowers the risk of injury during part handling. A roller deburring tool rounds the punched edges, making them suitable for appearance pieces. A high-quality result can be obtained within the sheet thickness ranges by adapting the roller contour to the modified burr and to the width of the separation gap.

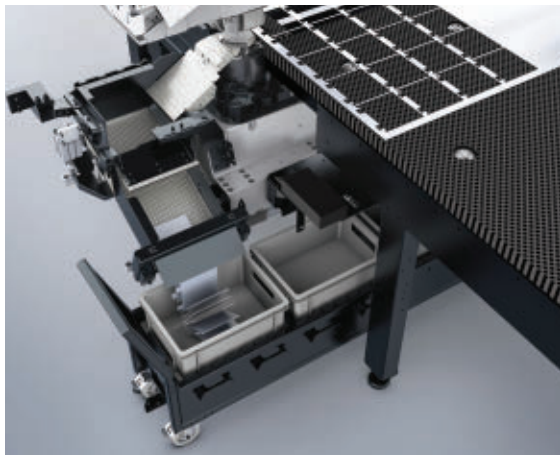
Ball Deburring. With a ball deburring tool, you can deburr small, complex holes and corners and large contours on workpieces. The cone-shaped punch head allows you to deburr close to formed sections as well.

Tapping. A punch machine is equipped with forming tools, such as a tapping tool, that enable you to form sheet metal parts. Using a tapping tool, you can create threads directly on the machine without chip formation. That's because the tapping process displaces rather than cuts the material. Manufacturers can create threads in a pre-processed punch hole or extrusion. The threads formed during this process are stronger than threads that have been cut into the part, enhancing fit accuracy.

Bending. Bending tools help to lower part costs by reducing downstream work steps. Bending with the punching head lets you complete multiple processes on one machine. A bend angle up to 90 degrees is achievable. Machine utilization increases while part cost decreases. Mark-free edges can be obtained through the bending roller in the die.

360-degree Tool Rotation Pushes the Limits

Perhaps the greatest example of the flexibility that a punch machine can offer is 360-degree tool rotation. While a stamping press can provide consistency and accuracy with a single hit, it produces just that: one part. The punch machine can rotate tooling and form or create holes in any alignment. Because a tool can be rotated in any direction, the programmer can dial in a program to ensure a quality part for whatever the application may be. Tool customization combined with complete rotation can create a world of new opportunities for faster and more efficient production.



A punch machine integrated with automation and material handling accessories such as part chutes, part removal flaps, conveyor belts, and automated sheet loading and unloading machines reduces manual handling.

Automation Accelerates Productivity

A machine integrated with automation can significantly reduce downtime on the shop floor. Material handling accessories such as part chutes, part removal flaps, conveyor belts, and automated sheet loading and unloading machines reduce manual handling and can enhance efficiency. Raw material coil and blanks can be loaded automatically onto the machine and positioned for processing.

Additionally, scrap skeletons can be unloaded from the machine, ready for the scrap bin. Parts can be unloaded autonomously into containers where they can be organized and brought to the next stage in the manufacturing process. The right automation strategy means less manual part separation and

A punch machine helps stampers respond to market challenges for more customization, design changes, and small production batches.

sheet loading and unloading and more productivity.

Laser Integration Empowers Versatility

Laser integration brings a dynamic situation to the custom punching tool environment. A punch/laser combination machine can either run as a stand-alone punch press or a flat-bed sheet cutter. This option offers a backup to both technologies.

These machines can be equipped with either a CO_2 or fiber laser and can vary in power capacities. One of the largest benefits this machine type offers is it allows the stamper to decide how the part will be processed. For example, say the part requires a burr-free laser edge and louvers. This could be accomplished with one combination machine.

Laser integration brings a dynamic approach to the custom punching tool environment. Punch/laser combination machines can run both as a stand alone punch press or a flat-bed sheet cutter.

Flexible Technology for a Changing Market

It has never been more important to consider versatility when selecting a machine for a production line. With the climate of the manufacturing market changing, seemingly daily, a flexible machine is necessary to keep up with changing customer demands. There is no such thing as being too flexible when working with valued clients; therefore, adaptive equipment that empowers a manufacturer to implement innovative ways to increase capacity and work flow will keep customers satisfied and coming back.

Roger Michaud is product manager TruPunch/TruMatic sales for TRUMPF Inc., 111 Hyde Road, Farmington, CT 06032, 860-255-6260, roger.michaud@us.trumpf.com, www.us.trumpf.com.

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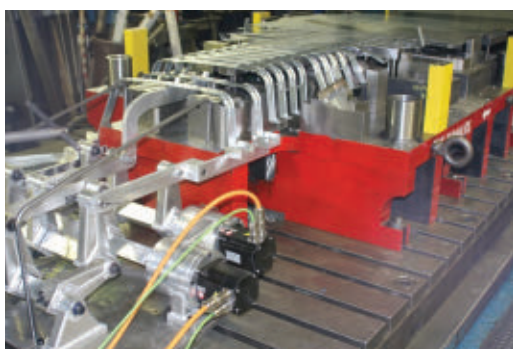

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How to perform a CLUTCH-BRAKE RETROFIT

Resetting the heart of the press breathes new life into stamping operations

By Thomas Coyle Sr.

In most cases, the key assembly on any mechanical stamping press is the clutch-brake. This is what starts and stops the press. It is the heartbeat of the press, so to speak.

How well the press starts and stops typically depends heavily on the clutch-brake's condition. If the press starts and stops well, particularly in single-stroke applications, it can directly affect the stamper's throughput—and ROI.

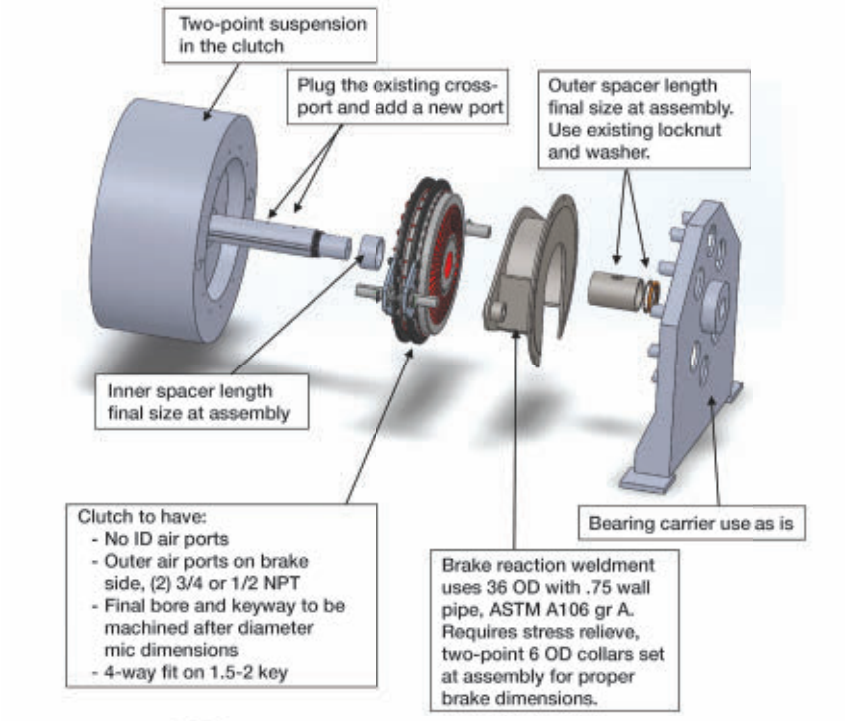
Stamping manufacturers are always looking for ways to improve their operations. Modernizing the press's running condition is an obvious way to do that and, in particular, the running condition of the clutch-brake. A lot can be learned about the health of the press and clutch-brake by evaluating the throughput of the press and the quality of the parts it produces.

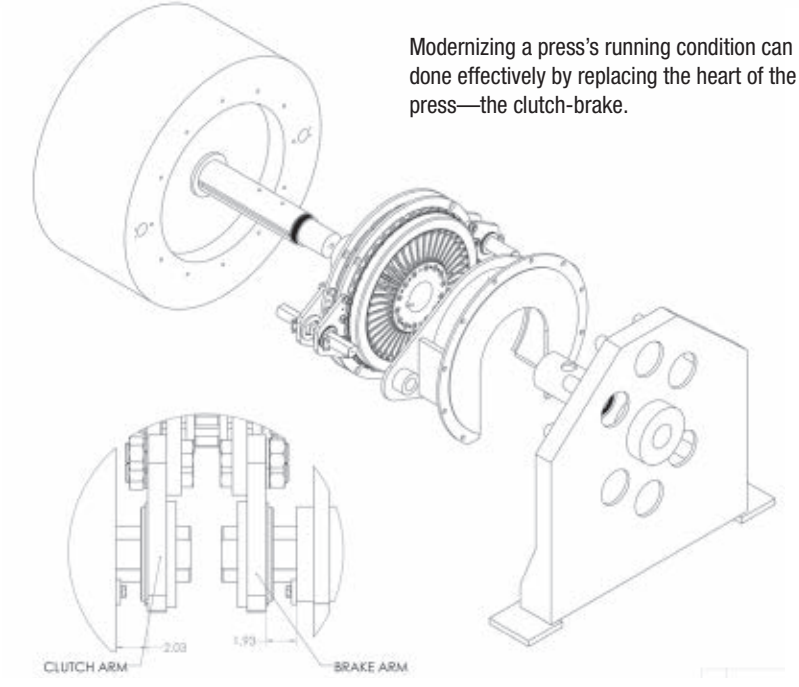
This evaluation process will determine the overall equipment effectiveness (OEE), commonly measured as Availability x Quality x Performance.

THE PINCH POINT OF MODERNIZING YOUR PRESS

"Pinch point" describes the current status of clutch-brake maintenance. It is caused by a combination of external and internal pressures.

External Pressures. Market demands are pushing toward modernization beyond a simple repair or replacement. Customers expect stamp-





Modernizing a press's running condition can be done effectively by replacing the heart of the press—the clutch-brake.

ings to be produced and delivered more quickly than ever, at greater volumes, and with expanded capabilities. There is a heightened demand for new and upgraded processes.

Internal Pressures. The skilled worker shortage has created a reduction of skilled and trained workers to perform rebuilds. Just-in-time and lean manufacturing practices limit the stock of spare parts. Older equipment can break down more frequently without planned downtime, and replacement parts are often obsolete.

These pressures do not allow for unplanned or planned downtime, lengthy maintenance efforts, or long part delivery times. Therefore, rebuilds with long lead times and high costs are no longer widely accepted.

Inevitably unfit machinery leads to uncontrolled downtime and an inability to meet production requirements. This expands costs beyond what most stampers can afford.

So how can management decision-makers and plant managers address this pinch point effectively? There is another option.

RETROFIT CLUTCH-BRAKE, NOT REBUILD

An alternative—a retrofit—may be a way to ease the pinch point you may be in. Replacing the clutch-brake could be a more cost-effective and timely approach than rebuilding an existing assembly, whether the stamper does the rebuild in-house or outsources the process. Another benefit of converting or replacing the clutch-brake to a new assembly is that, typically, the stamper will gain many advanced operating and servicing features that a new unit provides.

Are you experiencing the following?

- Need for excessive adjustments
- Frequent replacement of friction discs and inserts
- Temperature increases and spikes
- Inconsistent starts and stops
- Need for frequent component replacement
- Clutch-brake overlap, in which the operation of the clutch (starting) and the brake (stopping) overlap, essentially fighting against each other
- Obsolete parts and nonexistent drawings

HOW TO RETROFIT, STEP BY STEP

A new clutch-brake must be adaptable to the specific stamping environment, such as the manufacturing processes used and, most important, personnel practices and attitudes.

1. **Site Visit.** The best way to begin a successful clutch-brake retrofit evaluation is with an on-site visit by a retrofit company. The optimal meeting would include management, maintenance, production manager, and operator:

- Discuss the good, the bad, and the ugly.
- Define the project objectives of each group.
- Determine whether the goals are the same, similar, or different.
- Identify where a cohesive thread regarding goals and objectives exists.

2. "Meet" With the Press. Read the press specifications so that you all know or are refamiliarized with the

CASE EXAMPLE: RETROFIT A 1,200-TON VERSON PRESS OEM CLUTCH-BRAKE

Based on a static inspection of the press without a full clutch-brake calculation, an engineering summary and project prints were completed.

Scope of Work:

1. Remove existing flywheel/shaft assembly from press.
2. Inspect and document the condition of the shaft pillow block bearings and pinion gear.
3. Ship existing flywheel/shaft, bearing carrier, rotary union, and safety valve to dealer.
4. Inspect the condition of flywheel, bearings, shaft, rotary union, and safety valve.
5. Dealer ships new clutch-brake with rough bore to installer for retrofit.
6. Finish machining the bore to print specs and key the clutch-brake or use locking ring.
7. Plug existing air cross-hole ports on shaft and add new air cross-hole ports per project print.
8. Machine holes in flywheel for clutch pins and keeper plate screws per project print.
9. Manufacture new clutch spacer per drawing, adjusting the spacer to meet the clutch arm dimension.
10. Manufacture new end-of-shaft spacer per print.
11. Manufacture new brake reaction bracket per print.
12. Manufacture new collars per print and weld to brake reaction bracket.
13. Mount clutch-brake to flywheel/shaft assembly and test with rotary union and safety valve.
14. Ship to stamping plant.
15. Assemble flywheel/clutch-brake/shaft assembly, brake reaction bracket, and bearing carrier onto machine.
16. Install valve, rotary union, and air supply to shaft and test.
17. Cycle-test clutch-brake/run-off press to check correct operation.

RESULT

The true success of a clutch-brake retrofit is measured over a period of years. The first measure, however, is whether the press meets or exceeds the defined operation specifications.

A similar 1,200-ton press application with a clutch-brake installation has been running since 2013, nearly seven years, delivering twice the anticipated cycle life: 3 million cycles at maximum speed, single-stroke compared to the original calculation of 1.5 million.

press capacity and limits. Evaluate the running condition of the press. Typically, the maintenance group has this information.

•Get documented assessments on the clutch-brake's continued performance, such as mean time between failure (MTBF) and mean time to repair (MTTR).

•Gather as many detailed specifications as possible, such as tonnage rating, stroke length, maximum RPM at the crankshaft and flywheel-clutch-brake.

•Evaluate the plant's maintenance and preventive maintenance practices and schedules. Isolate one clutch-brake that best matches the typical manufacturing and maintenance processes, procedures, and environments of the plant.

Upon reviewing the operating conditions and parameters of a stamping facility, a clutch-brake system provider can recommend which equipment best fits the plant's manufacturing environment. For instance, a best practices recommendation may be to replace a pneumatic clutch-brake with a hydraulic model, because the hydraulic unit typically has a longer life cycle. This would optimize the single-stroke rates and provide more controllable starts and stops.

3. Clutch-Brake Sizing. In selecting a clutch-brake sizing platform, consider heat generation, cycles, stopping angles, torque requirements, and so forth.

Key to this process is that to make the best recommendation, the clutch-brake provider must gather technical and environmental information, including the customer goals, and discuss them with your internal engineering personnel and management.

4. Engineering Study. An engineering study must be done to ensure that you receive the best system for your operation. This will involve:

•Evaluating the drive system condition.

•Evaluating the compatibility and adaptability of the clutch-brake to the press.

•Determining the necessary installation requirements: bracketry, driveshaft modifications, and other requirements that will be necessary to replace the existing clutch-brake and install the new one.

•Conducting studies such as finite element analysis (FEA) on certain components, such as a brake reaction bracket, clutch mounting plate, and any driveshaft-bearing carrier modifications.

Thomas Coyle Sr. is an independent sales specialist for Torque Technologies Inc./ Goizper USA, 1623 W. University Pkwy., Sarasota, FL 34243, 941-358-9447, www.goizperusa.com.

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Model, Output, and Capabilities													Dimensions and Structure							Controls			
		Drive System					Energy Mgt. System			Speed Range (SPM)							Straight Side							
Model	Capacity Range (Tons)	D	S	TM	Stroke (in.)	Rated Tonnage Above BDC (in.)	C	KB	AM	Min.	Max.	Max. Energy (kJ)	Bolster Size Range (in.)	Shut Height (in.)	Shut Height Adj. (in.)	Gap or C Frame	w/Tie Rod	w/o Tie Rod	Suspension Points	Guiding Points	Control Platform	No. of Motion Profiles	Tonnage Monitor Sensors	Die Protection Inputs
AIDA-AMERICA | Dayton, OH																								
DSF-C1	80-250	✓			.25-11.81	.2-.25	✓			1	195	24	40 x 24 to 68 x 35	12.5-21.25	3.15 x 4.72	✓			1	6	Mitsubishi	Inf.	2	7
DSF-N1	80-300	✓			.25-11.81	.2-.25	✓			1	195	18	27 x 18 to 51 x 35	12.5-22.44	3.15 x 4.72			✓	1	6	Mitsubishi	Inf.	2	7
DSF-N2	110-300	✓			.75-11.81	.2-.25	✓			1	175	39	65 x 26 to 102 x 47	15.75-25.5	3.5-5.1			✓	2	6	Mitsubishi	Inf.	2	7
DSF-M2	300-2,000				3-30	.25-.75				1	100	280	120 x 60 to 300 x 96	20-60	11.81-15.75				2	8	Allen-Bradley Mitsubishi Siemens	Inf.	4	64
DSF-S1	500-800	✓			3-20	.25-.75	✓			1	60	270	50 x 50 to 60 x 60	15-30	11.81-15.75		✓		1	8	Allen-Bradley Mitsubishi Siemens	Inf.	4	64
DSF-S2	800-4,000				3-30	.25-.75				1	60	375	168 x 72 to 300 x 96	15-30	11.81-15.75				2	8	Allen-Bradley Mitsubishi Siemens	Inf.	4	64
DSF-S4	800-4,000	✓			3-30	.25-.75	✓			1	50	375	120 x 72 to 300 x 96	20-60	11.81-15.75		✓		4	8	Allen-Bradley Mitsubishi Siemens	Inf.	4	64
ANISTEK MECHATRONIC GMBH | Oberhaching, Germany																								
MONO500	5	✓			200	5				0	160			13.78	5				8	8	Beckhoff Automation	4		1
CNC1000	20	✓	✓		15.5	20	✓			0	100			13.78	10		✓		4	8	Beckhoff Automation	4		8
BECKWOOD PRESS CO. | St. Louis, MO																								
EVOx	.5-50	✓		✓	6-24	Full Stroke	✓			0	60	To spec.	6x10 to 20x30	0-18	0-24	✓	✓		0	4	Proprietary	3		0
Beckwood Servo-Electric	.5-200	✓		✓	6-24	Full Stroke	✓			0	60	To spec.	10 x 10 to 120 x 120	0-60	0-24	✓	✓	✓	0	4 or 8	Proprietary	Inf.		0

Drive System: D = Direct, S = Spindle, TM = Torque Multiplier
Energy Management System: C = Capacitors, KB = Kinetic Buffer, AM = Additional Motors

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Model	Capacity Range (Tons)	D	S	TM	Stroke (in.)	Rated Tonnage Above BDC (in.)	C	KB	AM	Min.	Max.	Max. Energy (kJ)	Bolster Size Range (in.)	Shut Height (in.)	Shut Height Adj. (in.)	Gap or C Frame	w/Tie Rod	w/o Tie Rod	Suspension Points	Guiding Points	Control Platform	No. of Motion Profiles	Tonnage Monitor Sensors	Die Protection Inputs
FAGOR ARRASATE USA INC. | Willowbrook, IL																									
DSEM-1	440-1,100	✓			4-26	.25-4		✓		1	180	250	80 x 40 to 120 x 70	20-60	4-10			✓	2	8	Siemens	Inf.	2	16+
DSE-1 DLE-1	600-1,500	✓			7-12	.4-.5		✓		1	100	300	135 x 80 to 200 x 104	40-68	4-22		✓		4	8	Siemens	Inf.	4	16
DSE-2 DEL-2	800-4,000	✓			30-52	.5-1		✓		1	30	1,300	135 x 80 to 280 x 104	48-81	4-22		✓		4	8	Siemens	Inf.	4	16
KOMATSU AMERICA - PRESS TECHNOLOGY DIV.| Rolling Meadows, IL																									
H1F-2	121-220	✓			1.18-9.8	.24	✓			1	138	36	43 x 26 to 57 x 33	13.8-18.9	3.9-4.7	✓		✓	1	6	Proprietary	Free to 18 presets	2	6
H1F-11	39-88			✓	1.6-5.1	.12-.24	✓			1	240	7	27 x 15 to 39 x 24	8.3-12.6	2.2-3.1	✓			1	6	Proprietary	Free	2	6
H2FM	400-1,600	✓			3.1-23.6	.50-.29	✓			1	106	440	96 x 51 to 245 x 87	23.6-39.4	13.8		✓		2-4	8	Proprietary-interface with A/B, Siemens, others	Free to 18 preset	2-4	8-16
H2W	200-300			✓	5.9-11.8	.25	✓			1	85	108	85 x 43 to 95 x 47	19.7-23.6	4.7-7.9			✓	2	6	Proprietary	Free to 8	2	6
NIDEC PRESS & AUTOMATION | Minster, OH																									
Nidec Minster P2H-FX Series	112-180	✓			2.4-7.8	.08-.24	✓			3	250	15	48-75	11-20	4-6		✓	✓	2	6	Siemens	Inf.	4	16+
Nidec Minster FX2 Series	330-660	✓			3-20	.24-.50		✓		3	120	224	72-168	24-44	6-10		✓		2	8	Siemens	Inf.	4	16+
Nidec Arisa S4 Series	708-4,500	✓			2-40	.16-.50		✓		3	100	1,200	140-280	28-66	12-16		✓		4	8	Siemens	Inf.	4	16+
Nidec Arisa S2 Series	280-2,250	✓			2-40	.16-.50		✓		3	100	700	100-240	12-56	12-16		✓		2	8	Siemens	Inf.	4	16+
Nidec Arisa S1 Series	280-1,125	✓			1-20	.16-.40		✓		3	150	400	48-60	12-40	6-8		✓	✓	1	8	Siemens	Inf.	4	16+

Model, Output, and Capabilities												Dimensions and Structure								Controls			
		Drive System					Energy Mgt. System			Speed Range (SPM)													
Model	Capacity Range (Tons)	D	S	TM	Stroke (in.)	Rated Tonnage Above BDC (in.)	C	KB	AM	Min.	Max.	Max. Energy (kJ)	Bolster Size Range (in.)	Shut Height (in.)	Shut Height Adj. (in.)	Gap or C Frame	Straight Side w/Tie Rod	Straight Side w/o Tie Rod	Suspension Points	Guiding Points	Control Platform	No. of Motion Profiles	Tonnage Monitor Sensors	Die Protection Inputs
Nidec Arisa GS2 Series	353-895	✓			2-18	.16-.25	✓	✓		3	105	200	34-35	24-35	8-12		✓	✓	2	8	Siemens	Inf.	4	16+
Nidec Minster MMC DX2-SV Series	110-300				1-12	.157-.250				2	120	38	53.5-94.4	15.7-21.6	3.5-4.7				2	6 or 8	Allen-Bradley	8	2 or 4	8-16
SEYI-AMERICA INC. | Tullahoma, TN																								
SDG2 / SDG4 Crankshaft	440-1,320	✓			13.78-17.72	.26-.51	✓			1	50		98.42 x 55.12 to 240.16 x 110.24	23.62-43.31	9.84-13.78		✓		2 or 4	8	Proprietary	8	4	8
SDE2 / SDE4 Eccentric Gear	440-2,640	✓			23.62-39.37	.51	✓			1	30		98.42 x 55.12 to 240.16 x 110.24	23.62-55.12	11.81-23.62		✓		2 or 4	8	Proprietary	8	4	8
SD2 Crankshaft	176-550	✓			8.66-13.78	.24	✓			1	60		75.20 x 29.92 to 105.51-51.18	17.72-25.59	3.94-5.12			✓	2	8	Proprietary	8	2	8
SD1 Crankshaft	88-330	✓			7.09-11.81	.20-.24	✓			1	80		37.40 x 26.78 to 57.09 x 41.34	12.99-21.65	3.15-4.72			✓	1	8	Proprietary	8	2	8
STAMTEC, INC. | Manchester, TN																								
iS2	160-550	✓			2-16	.5	✓			1	200	To spec.	60-144 L-R x 42-72 F-B	20-40	12			✓	2	8	Moog, Siemens, Delta	9		16
SDS	600-3,300	✓			8-36	.5	✓	✓		1	80	To spec.	84-330 L-R x 60-108 F-B	30-60	14		✓		2 or 4	8	Moog, Siemens, Delta	9		16-64
iS1	80-330	✓			2-12	.275	✓			1	180	To spec.	30-60 L-R x 14-28 F-B	8-18	6	✓			1	6	Moog, Siemens, Delta	9		8
SUCOREMA - STEFA | Maia, Portugal																								
PSR40	40		✓		3.85	40		✓								✓								

Battery charger designed for electric vehicles

Delta-Q Technologies has introduced the RQ350 sealed charger for electric vehicles and industrial machines. The 350-W charger is designed for applications such as pallet walkies, floor care equipment, outdoor power equipment, and mobile aerial work platforms.

The charger features overvoltage protection from the AC line and is compliant to a variety of worldwide regulations such as UL, FCC B/CISPR-14, and UNECE R10.

Delta-Q Technologies • www.delta-q.com

Feed gripper extends up to 100 mm

Bilsing Automation has announced the availability of a new feed gripper with extension capability for use in 2- and 3-axis transfer press lines and destacking applications. Weighing 2.27 lbs., it enables fast transfer movement speed, with a maximum velocity of 22 SPM for improved productivity.

The gripper can extend up to 100 mm, providing additional stabilization through the Z-axis movement to the part during press transfer. The central vacuum unit for cup holding is integrated in the gripper for a compact design, and part picking is done from the top, so no additional space is needed within the die.

Bilsing Automation North America • www.bilsing-automation.com

Microclamps offer compact way to handle sheet metal

PHD has introduced the new series GRM size 0 microclamps for sheet metal handling. The compact, 0.53-lb. clamps provide 135 lbs. of total clamp force.

They are available in standard and flange jaw styles.

PHD Inc. • www.phdinc.com

Cloud-based information resource helps eliminate excess inventory

Plex Systems has released the Plex Market Forecast Manager, a cloud-based information resource that is part of the Plex Supply Chain Planning Suite. It enables manufacturers to integrate internal and external data points alongside demand plans to help drive inventory decisions, gain market share, and evaluate and scale the supply chain. The initial release provides automated access to IHS Markit's Light Vehicle Forecast.

The product enables comprehensive and streamlined planning at the enterprise level, which includes integrated business planning, demand and supply planning, rough-cut capacity planning, and distribution requirements. This data then can be shared with the plant for production scheduling and execution.

Plex Systems Inc. • www.plex.com

Sanitizer kills viruses in manufacturing facilities

Madison Chemical has introduced Madisan 75, a four-chain quaternary surface sanitizer, disinfectant, mildewstat, and virucide for hard, nonporous, and inanimate surfaces. It kills the human coronavirus, HIV-1, hepatitis B virus, hepatitis C virus, and a variety of animal viruses. It appears on the EPA list N: Disinfectants for Use Against SARS-CoV-2.

The product can be applied using a sponge, brush, cloth, mop, or by immersion or other applications specified on the EPA label. Treated surfaces must remain wet for 10 minutes.

Madison Chemical • www.madchem.com

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How can I maintain proper stripper clamp force?

BY THOMAS VACCA

Q: We are experiencing a stripping problem with our single-hit piercing tool. The tool construction is a basic three-plate design. The die chase has sixteen ¼-in.-dia. holes in a 4- by 4-in. array. We are piercing a 7-mm-thick aluminum plate in one step. The stripper has 10 springs providing 15% of the needed punching force.

After piercing is complete and the press begins to retract, the aluminum plate sticks to the punches. The spring-loaded stripper does not strip the raw material off the punches as the tool moves up off dead bottom of the stroke. There is a delay and then a severe snap, resulting in a heavy bang that occurs at some point during the upward cycle of the press as the stripper finally strips the material off the punches. We added four spring pins to eject the plate off the face of the stripper, but this did not help.

We reengineered the punch-to-die clearance from 3% to 6%, because the fracture plane of the slug was irregular and showed signs of secondary shear. This improved the fracture plane a bit but did not solve the problem. For design reasons, it is impossible to add more springs to the stripper.

Should we increase die clearance again? What is the correlation between die clearance and stripping force?

A: This is not an uncommon problem, and you should give it ample consideration during the tooling design phase. Always calculate the theoretical spring pressure required; double it when using the stripper for clamping during cutting and triple it when using the stripper to clamp the material to prevent movement during forming. One of the common causes of dimensional variation when blanking and forming in large, complex progressive dies is the lack of sufficient spring pressure to prevent unwanted raw material and stripper movement while work is being done.

Die clearance, lubrication, tooling surface finish, and raw material properties all affect stripping force, so it's hard to calculate.

This is one of the reasons I am such a big fan of using nitrogen springs in progressive tooling. In recent years they have become very reliable, and generally you can get two to three times the spring force in about the same space as a coil spring. In addition, we have been able to run them at speeds well over 600 strokes per minute.

The example you have asked about is fairly straightforward. Your tool design does not have enough spring pressure to overcome your stripping force. It's hard to calculate this exactly because, as you noted, the die clearance affects it. (The tighter the clearance, the greater the stripping force required.) The lubrication, tooling surface finish, and raw material properties also affect stripping force. But there are textbook formulas for calculating cutting and stripping forces:

•Cutting force = Periphery length x Sheet thickness x Shear strength

•Stripping force = 10% to 20% of cutting force

(After calculating stripping force, add a minimum 30% safety factor)

Provided no shear and break requirements are spelled out on the part print, there are a couple ways to ensure you have the proper punch-to-die clearance:

•If the pierced hole is a few tenths of an inch smaller than the punch size, the clearance is too tight. If the hole is bigger, the clearance is too high.

•If you can measure a slight bulging or increase in material thickness around the trimmed opening in the progressive die strip, the punch-to-die clearance may be too tight and the stripper spring pressure too light, which allow the material to bulge during piercing.

Good luck, and happy stamping!

Stumped by a shop floor stamping or tool and die question? If so, send your questions to kateb@thefabricator.com to be answered by Thomas Vacca, director of engineering with Micro Co., www.micro-co.com.

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