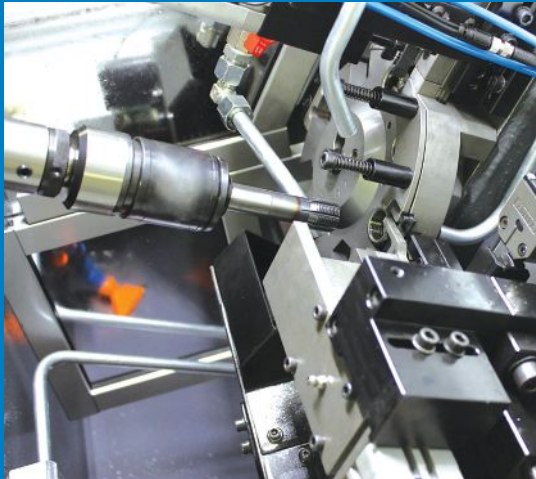


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TAPPING...P. 50-56



SECONDARY OPERATIONS...56, 67, 79, 83-86

Materials...58



Threaded Rod...74



P. 87



Retaining Rings... 118

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Fastener Focus

Focused News, Information and Products for Fastener Distributors, Importers, Manufacturer's Representatives, OEMs and End Users.



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In this issue...

- FF News & Info**
- The Traveling Salesman Spends 10 Minutes with... Joe Kochan, Elgin Fastener Group**
- STAFDA Relocates and Reschedules Annual Convention & Trade Show**
- Next-Generation Concrete Screw Anchors**
- Retaining Rings Roundup**
- Partnership for 360° Joining Technology**
- "Ask The Expert" JIS Hex Flange Bolts & Hex Flange Nuts**
- FF Products**




New Simple & Repeatable Flat Die Thread Roller Set-Up Process

by:

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Retrofit to existing flat die thread rollers, effectively takes the mystery out of machine set-up, replacing it with an easy-to-implement, repeatable process.

I have been in the fastener industry for 35 years. Like any industry that's not headed for extinction, new ideas and technology are regularly introduced and continually evolving. However, like most mature, nontech industries, both the rate of introduction and the impact of new technology in fastener manufacturing is pretty modest. In fact, over my 35 years in fastener manufacturing, I have seen my share of advancements and improvements to manufacturing technology, but they have generally been small, incremental improvements rather than large, game changing leaps in technology. Recently, though, I encountered a technology that excited me in its potential to revolutionize thread rolling, a fastener manufacturing process that has exhibited few significant technology leaps in the last thirty years.

The technology I discovered is from a start-up company called **Mule Technology, LLC**. The company has developed a retrofit to existing flat die thread rollers, which effectively takes the "voodoo" out of machine set-up and replaces it with a simple to implement and repeatable set-up process. In doing so, the technology addresses the long-standing problem that setting up these rolling machines is complicated and often takes many months or even years for operators to master the technique.

At first glance and to the uninitiated, flat die thread rolling appears to be pretty straight forward. An unthreaded fastener blank is fed between two matched flat rolling dies. One of the dies is shorter and resides in a stationary die pocket while its partner is longer and is located on a moving ram. When the ram is retracted all the way back, a blank is fed into the gap between the dies and the ram strokes forward, grabbing the newly introduced blank and squeezing it as it rotates. The spacing between and orientation of the dies triggers material to flow into the die grooves developing a little more of the thread with each rotation until it is complete and rolls off the end. Although mostly lost on the casual observer and perhaps any individual that has never personally set-up one of these machines, this is really an "intricate dance" as it requires just the right pressure, spacing and tilt to the dies to produce high-quality parts and prevent the dies from premature wear or failure. Learning to get this set-up right is usually an art form developed over years of practice.

This exposes a second challenge faced by fastener manufacturers today. Skilled operators have been getting older and steadily retiring or leaving the industry. Without new or interested replacements, this exodus has created a Skills Gap within fastener manufacturing. To compound the problem, fastener manufacturers have no means of recruiting skilled rolling operators short of stealing them from some other

manufacturer. There are no industry-wide training programs for roller set-up so that generating newly skilled operators can only be accomplished by in-house, on-the-job training programs. Although this may not be a hurdle for some fastener manufacturers, by and large, it is a challenge faced by most small and medium sized manufacturers who lack the resources for a formal or well executed on-the-job training program. As a result, most companies simply place new hires under the guidance of a more experienced, longer-tenured employee. This partnership is often limited by the number of available "trainers" and their individual training skills. Just because an individual is an excellent roller man does not guarantee they will make excellent trainers.

How does this new technology address these two industry challenges?

Simple to Use and Repeatable Set-ups:

Currently, fastener manufacturers usually segment their manufacturing by operation, so that there are separate heading, rolling and secondary operations departments. Each department has individuals skilled in all or some subset of the equipment in that department, but with little or no cross pollination into how to operate equipment in the other departments. There is nothing inherently wrong with this model, but it means that the talent pool in rolling is limited almost exclusively to the existing rolling department.

Although most fastener manufacturers expect their operators to be capable at both set-up and machine operation, the reality is that their rolling team consists of individuals with varying degrees of experience and expertise. Set-up, in the traditional way, is as much art as it is science. Dies must be precisely positioned in the die pocket to provide just the right orientation and pressure on the blank to properly form the thread. This is accomplished by shimming the dies in several different axes. Getting it just right can often be time consuming and a function of the degree of experience gained over many trials and set-ups.

The brilliance of the Mule Technology is that it removes almost all of this "guess work" and replaces it with a maximum of four different adjustment points. The Mule Technology package starts with a retrofit kit available for any brand or style of flat die roller. The kit provides a new Stationary Die Pocket with a top clamp, a Key Kit (referred to as "Mule Keys™") in either inch or metric alternatives (**Figure 1**) and "Mule Recipes™", which is a computer APP enabling repetitive and uniform set-up instructions. The fundamental essence of this technology is the "Recipes" and the associated Mule Key combinations.

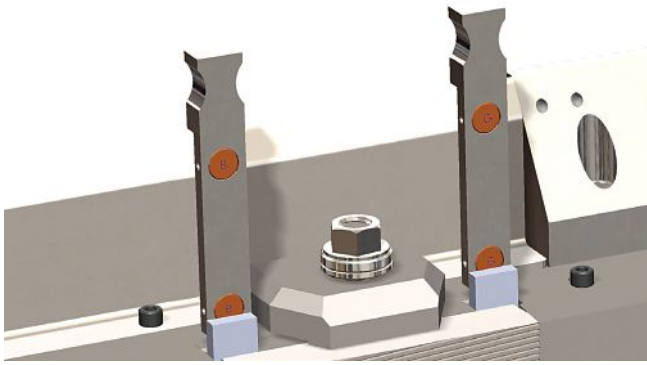


Fig. 1 — Mule Key System.

The Mule Key kit is the central component that determines the positioning of the die. There are three components to each kit, which are designed for placement in the retrofit Stationary Die Pocket. These are Bars, Discs and Disc Inserts. Each set-up uses two bars, one that will be positioned at the leading end of the Stationary Die and the second at the trailing end. Each kit comes with 12 sets of bars. For the inch series, there are 10 numbered bars increasing in thickness by 0.010" increments and a set each at 0.100" and 0.200". The metric series has 10 numbered bars increasing in thickness by 0.250 mm increments and a set at 2.50 mm and 5.00 mm. There are two Disc Inserts with holes machined near the top and bottom. These holes are designed to fit the Discs. Each kit comes with 15 sets of four discs increasing in thickness by 0.001" increments for inch and 0.025 mm for metric. Each Disc is alphabetically labelled and fits into any one of the holes in the Disc Insert (**Figure 1**).

Each Disc protrudes past the face of the Disc Insert by the amount the Disc is designed for. By varying the combination of Bars and Discs the operator is able to precisely position the dies in a fashion that provides the optimal results for the thread being produced. In fact, although each kit consists of four equally sized Discs and two equally thick Bars, they are not all required to be used simultaneously. They can be varied horizontally (leading edge contains a different combination of Disc and/or Bar than the trailing edge) to produce a wedge or taper in the spacing between the dies effectively changing the die pressure on the blank (**Figure 2**). They may also be varied vertically (the Disc in the top position of the Disc Insert is different than the Disc in the lower position) producing an incline (or Tilt) in the dies to be used on tapered blanks (**Figure 2**). Since each Bar and Disc is labeled, when the optimal combination is determined, it can be saved in the included Mule Recipe APP to provide consistent, uniform set-ups (**Figure 3**) in the future.

Addressing the Skills Gap:

Therefore, for users to reap the full advantages of this technology, they must train or develop at least a few of their current roller men to become "Recipe Creators". These individuals will become experts in the technology and determine the optimum combination of Bars and Discs needed to generate the necessary spacing and tilt at the leading and trailing edges of the die in order to make the best quality parts. Although

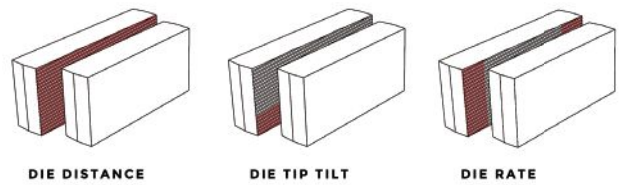


Fig. 2 — Die Orientations Set by Recipe.

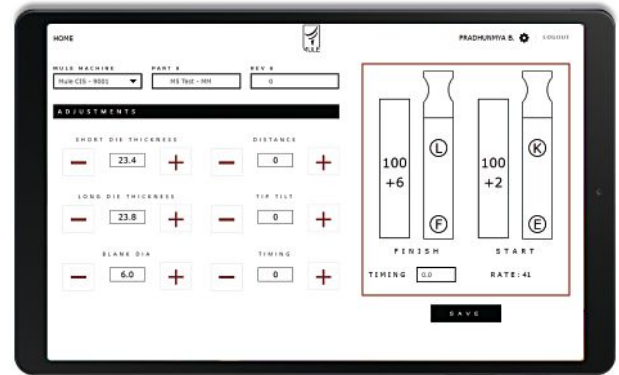


Fig. 3 — Recipe APP.

"Recipe" creation appears to be pretty straight forward, it will require someone with some expertise in thread rolling and thread rolling set-up to master the skill.

This provides a segue into how this technology addresses the second major challenge felt by fastener manufacturers today, addressing the Skills Gap.

Traditionally fastener manufacturers, large and small, have had to develop roller operators and set-up personnel from within their own ranks because no formal training programs for this expertise really exist in the trade schools or community colleges. Therefore, when companies need to fill gaps in or expand their rolling departments, they generally experience a dearth of skilled applicants and so must either promote someone from within or hire an individual with mechanical aptitude but little or no direct thread rolling experience.

This problem is universally experienced by fastener manufacturers and means that these inexperienced operators must gain experience on-the-job. Once again, any manufacturer reading this knows that this is no trivial task. In fact, it may take several years and hundreds of set-ups for an operator to really get good. As more and more Baby Boomers reach retirement age, fastener manufacturers, especially those with older work forces, are faced with multiple departures in short spans of time. The result is rolling departments heavily populated with individuals of low or intermediate skill levels lumbering along in the early stages of expertise development.

The Mule Technology will seemingly address this issue because once a "Recipe" is developed, anyone of even simple mechanical aptitude can successfully set-up and run a suitably equipped thread roller. This significantly shortens the length of time needed to get an individual into a position where they are truly productive.

Of course, for an individual to complete one of these set-ups, he or she must have a "Recipe" to follow. The "Recipe Creator" role will take a little more expertise and training. In addition to storing the recipes for future use, the Mule Recipe APP includes utilities, which assist the creator in coming up

with recipes for new parts. Mule Technology, LLC provides technical support to assist new users with training and development of “Recipes”. Although it would certainly be prudent to have multiple individuals that are “Recipe Creators”, the reality is that initially only one or two individuals need to be able to carry out this role. Not having to depend on the entire department to possess an intermediate or better skill level is a noteworthy bonus as it allows those new to the department, less experienced or uncomfortable with technology to first simply learn the best practices of operating a roller using the recipe instructions and work into becoming “Recipe Creators” in their own timing. Following such a model will ultimately net the fastener manufacturer’s rolling departments with more expertise over a shorter time period than if all were being trained using traditional training methods and technology.

Although I am very impressed with this technology, interested users should not assume that you can simply “plug-in” a retrofit kit and all your thread rolling challenges are solved. Quite the contrary, effectively introducing this technology will take commitment by manufacturing, thread rolling and company leaders to culturally change their organizations to adopt these methods over the ingrained “way it has always been done” methods. This will take perseverance and a full investment to effectively train and educate the rolling department in how this technology can provide benefits in efficiency, ease of use and quality improvement. Mule Technology should be

interesting to all fastener manufacturers, but especially those that want to rapidly increase the expertise of their rolling department and to obtain fast, uniform changeovers every time.

I have only touched on several of the significant and immediately recognized advantages of this technology. However, I feel that companies who decide to embrace this technology may find other advantages not yet explored in this brief article. In particular is the potential to really glean and analyze data that can lead to quality and productivity improvements. To my knowledge, nothing with this sort of continuous improvement capability exists in thread rolling today, so that any proactive company wishing to fully exploit this new, exciting technology could leap frog their competition on many fronts. Without trying to take anything away from the many industry advancements over the years, in my opinion Mule Technology is a potentially game-changing technology the likes of which we have not been seen in the fastener industry in many years. You can learn more about this technology at Mule Technology, LLC’s website. www.muletechnology.com

FTI

Mule Technology™ replaces the art of thread rolling with engineering. Any person should be able to set up a flat die with only a few days of training. The retrofit kit converts current thread rolling equipment into an ultra-high precision machine at a fraction of the cost. With this new stability, Mule Technology™ can accurately and quickly set up dies without the use of complicated automation. Die set ups are reduced to minutes, are repeatable and easily taught. www.muletechnology.com

SHOWCASE MACHINERY

Dashboard Monitors for Vacuum Furnaces

Featuring additional diagnostics

A new feature on the PdMetrics dashboard monitors including incoming three-phase utilities, voltage and frequency is now available on company’s line of TITAN® 2.0 vacuum furnaces. This new feature provides further diagnostics for the diffusion pump heater assembly.

Through the addition of these parameters, PdMetrics adjusts the expected kilowatt usage based on incoming line voltage, reporting precise diagnostic data, avoiding the potential for false alarms. The manufacturer has nearly 100 TITAN 2.0 furnace installations with the software.

The company’s predictive maintenance software for vacuum furnaces was developed in 2016 and helps customers minimize high-cost events as well as helps to maximize up time.

The software is available on any

model of the company’s furnaces, whether they are new or old.

The manufacturer’s product development team is continuously working to improve the capabilities of PdMetrics in order to provide faster and smarter diagnostics. The latest system features also include a snooze button to silence alarms while they are being addressed as well as an automated health report.

The manufacturer of PdMetrics is the global leader in heat treatment solutions with more than 10,000 operating systems in some 70 countries. Through the company’s Global Centers of Excellence in Vacuum and Atmosphere Equipment, it continues to deliver innovations in technology that advance thermal processing while helping customers achieve their goals. Focused on performance and



quality, the company supports commercial heat treaters and customers in many industries including aerospace, automotive, energy and medical. With locations in North America, Europe and Asia and the largest service team in the industry, the firm is committed to providing 360° support for customers worldwide.

If you would like to learn more about PdMetrics, contact **Ipsen**, Cherry Valley, IL, USA.

www.ipsenusa.com/pdmetrics