HORIZONS

The Feintool U.S. Operations Magazine

2020 Issue

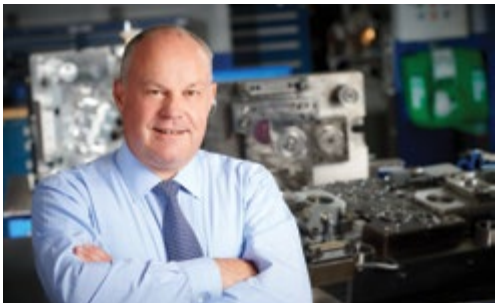
Vertically Integrated Process for Superior Flatness

What Defines Global Champions?

Hard Milling Replaces Hand Grinding

FEINTOOL

EXPANDING HORIZONS



"Difficulties mastered are opportunities won."

– WINSTON CHURCHILL

2020 has been an unpredictable year for all of us. While each year has its own challenges, this year has been more challenging than most. We are thankful to our customers and employees who have persevered, and for the privilege to manufacture world-class fineblanked and formed parts for automobiles, trucks, agriculture and medical.

I am particularly grateful to our Feintool employees who, through the uncertainty of the pandemic, remained flexible and committed to delivering parts to our customers. Our Cincinnati VP of Quality, Tim Runyan, said it well, "While COVID mandated social distancing, working as a team brought the company closer together." While we acknowledge the difficulties, we all have faced, we celebrate the opportunities we have won together.

Feintool's culture of innovation and forward thinking means that we are never satisfied with the status quo and are always looking at ways to deliver higher quality and greater value to our customers. Even through the difficulties of this year we have seized the opportunity to invest in state-of-the-art heat-treating capabilities in Cincinnati, OH and a new 880-ton press in Nashville, TN to increase production of critical powertrain components including clutch plates.

Expanding on our commitment to deliver the highest quality parts at the greatest value, vertically integrating the heat clamp tempering process reduces lead time and cost and produces greater quality, including part flatness.

Our newest 880-ton press will be operational Fall 2020 and yield additional capacity of 10 to 12 million clutch plates annually.

Great leaders and great companies not only define the times we are in but can define the path forward. Winston Churchill said, "Difficulties mastered are opportunities won." While we acknowledge the difficulties, we all have faced, we celebrate the opportunities we have won together.

Best regards,

Christoph Trachsler
CEO, Feintool U.S. Operations

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FEINTOOL'S HANDS-ON APPRENTICESHIP PROGRAM

Autumn Kirsopp is a third-year apprentice in Feintool Cincinnati's four-year program. She's completing her classroom training at Sinclair Community College and has completed her lathe, waterjet and pre-machining apprenticeship requirements with Feintool. "I thought about going into drafting, but I really like the hands-on approach to tool making," says Kirsopp. "Tool making is all about problem solving and requires out of the box thinking."

Unlike some of her friends that are taking out large student loans she says, "Feintool pays me as an apprentice and pays for schooling and books. This is a big advantage as I start my working career." Apprenticeship instructor Josh Younce is proud of the 46 people that have gone through Feintool's state-accredited program. "You have to be competitive because you want to attract the region's best talent," said Younce.

"Some gravitate to EDM or running CNC machines while others gravitate to tool making," said Michael Davidson, Senior Tool Room Supervisor. "If ever there was an intern with potential, it's Autumn."

OUT WITH THE OLD, IN WITH THE NEW

Feintool invests in large scale state-of-the-art CNC machining for productivity and quality enhancements in the tool room. With a table size of 1,850mm x 800mm our new Makino F9 machining center delivers speed, precision, versatility, and will help Feintool insource machining of large tooling components for improved control quality and shorten delivery times.

HEAT FLATTENING

FEINTOOL'S NEWEST VERTICALLY INTEGRATED PROCESS FOR SUPERIOR FLATNESS

Fineblanked automotive parts, such as clutch plates, are often subjected to tremendous wear and stress. You don't have to look further than the iconic yellow school busses to see this in action. From the frigid cold temperatures in Fairbanks, Alaska to the scorching desert heat in Reno, Nevada, millions of children rely on the dependable and essential transportation of school busses to get them safely to and from school.

School bus powertrains, with the constant stop-and-go operation, must perform reliably in extreme conditions. Fineblanked components with exceptional flatness, perpendicular cutting surfaces and a clean finish throughout the entire material thickness bring the precision and reliability to the hard-working transmissions.

HEAT TREATING ENSURES TOUGH, FLAT AND RELIABLE PARTS

The physical properties of fineblanked automotive parts must be optimized for their particular application. A heat treating process also called "heat flattening" or "heat setting," plays a vital role in achieving the desired flatness of fineblanked components.

Heat treating is a process, in which metal components are heated and cooled under tight controls to improve their properties, performance, and durability. It can harden, soften, or relieve stress on the metal without changing the part dimensions.

The process has always been a key element of Feintool's fineblanking manufacturing process, but until recently, Feintool partnered with a third-party provider to handle this step. Outsourcing the process entailed shipping fineblanked parts to the partner's facility, where they underwent the heat treating process. Afterward, the partner shipped the components back to Feintool for final inspection and delivery to customers.

Now, Feintool has brought this specialized operation in-house and incorporated it into its vertically-integrated manufacturing process.

"At Feintool, we pride ourselves on having a cradle-to-grave approach," said Lars Reich, EVP, Sales & Marketing, Feintool U.S. Operations, Inc. "From design, to our fineblanking manufacturing process, and now our heat treating capabilities, controlling these operations ourselves ensures we deliver the highest quality parts at the best value."

By vertically integrating these processes, Feintool has greater quality control over its products and can ensure repeatability, consistency, faster production, and lower costs.

THE HEAT TREATING PROCESS

Feintool produces transmission clutch plates in the millions. The company's fineblanking process is ideally suited for high volume clutch plate production.

The production process starts with coils of specially rolled steel. A precision leveler/straightener levels the material to within 0.2 mm flatness throughout the entire part. The fineblanking process utilizes high tonnage Feintool presses, with an integrated parts removal system, to lay the foundation for a precise, flat and perpendicular part. A brush deburr process guarantees a burr-free part with a controlled Ra surface finish.

Once the parts are fineblanked, heat treating ensures they are as flat and strong as possible. The heat treating process includes three necessary steps:

- Heating the parts to a specific temperature
- Holding the parts at that temperature for a specified time in a controlled atmosphere
- Cooling the parts according to prescribed methods

Here's how the process works at Feintool. First, the fineblanked parts are brought from the production facility into the heat treating area. Since both of these facilities are at the Cincinnati campus, Feintool can maintain seamless and fast production.

Next, the fineblanked components are passed through a press and compressed under five tons of force. After leaving the press operation, the parts move onto trays, and an automated process takes over.

"At Feintool, we pride ourselves on having a cradle-to-grave approach"

The automation process takes the parts into the furnace, where Feintool precisely controls the temperature as well as the ramp up, soak time, and cool down phases. The parts enter the furnace and remain for a set number of hours depending on the "recipe" required for different clutch plates. While the parts are in the oven, nitrogen is introduced into the environment to avoid oxidation, which can compromise component integrity. After they have "soaked" for the appropriate amount of time, they leave the furnace and enter a final air-cooling station to cool back down to the desired temperature. The entire process takes from 6 to 8 hours depending on part requirements.

"By precisely controlling the temperature, time, and the cool-down phase, we can make sure we're not introducing additional stresses, which can deform and weaken the material," said Dan Todaro, Director of Manufacturing for Feintool Cincinnati.

After the parts are unloaded from the cooling station, they are visually and dimensionally inspected before being packed into containers and shipped directly to customers.

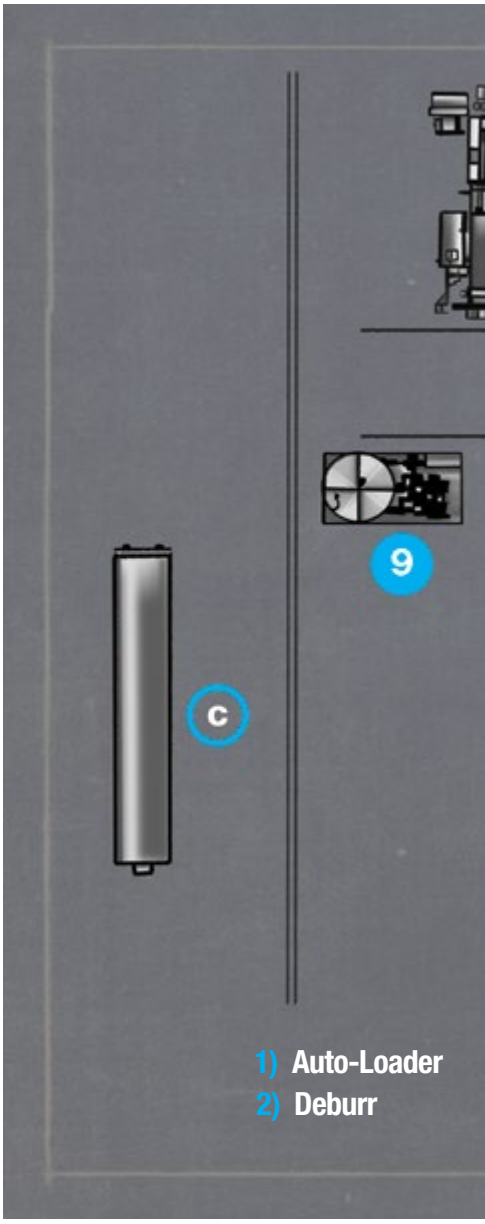
THE VALUE OF OWNING THE PROCESS

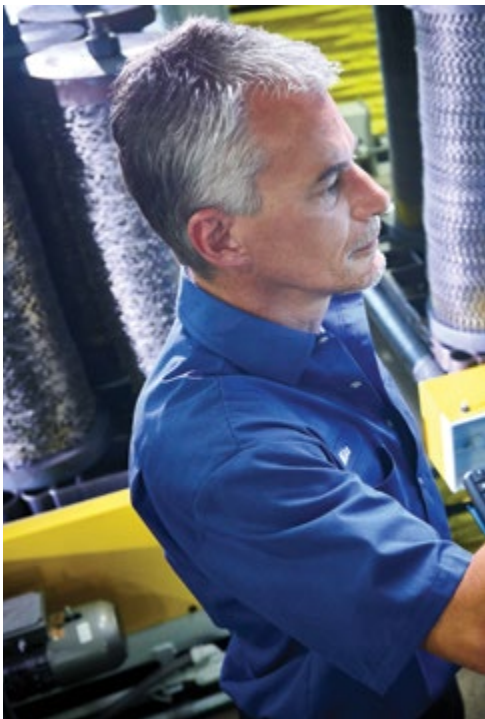
One way Feintool maintains its competitive edge is by continuously refining its manufacturing processes to be as efficient and cost-effective as possible. With a precise process such as heat treating, fine-tuning specific variables, such as time and temperature, can have a drastic impact on the final product.

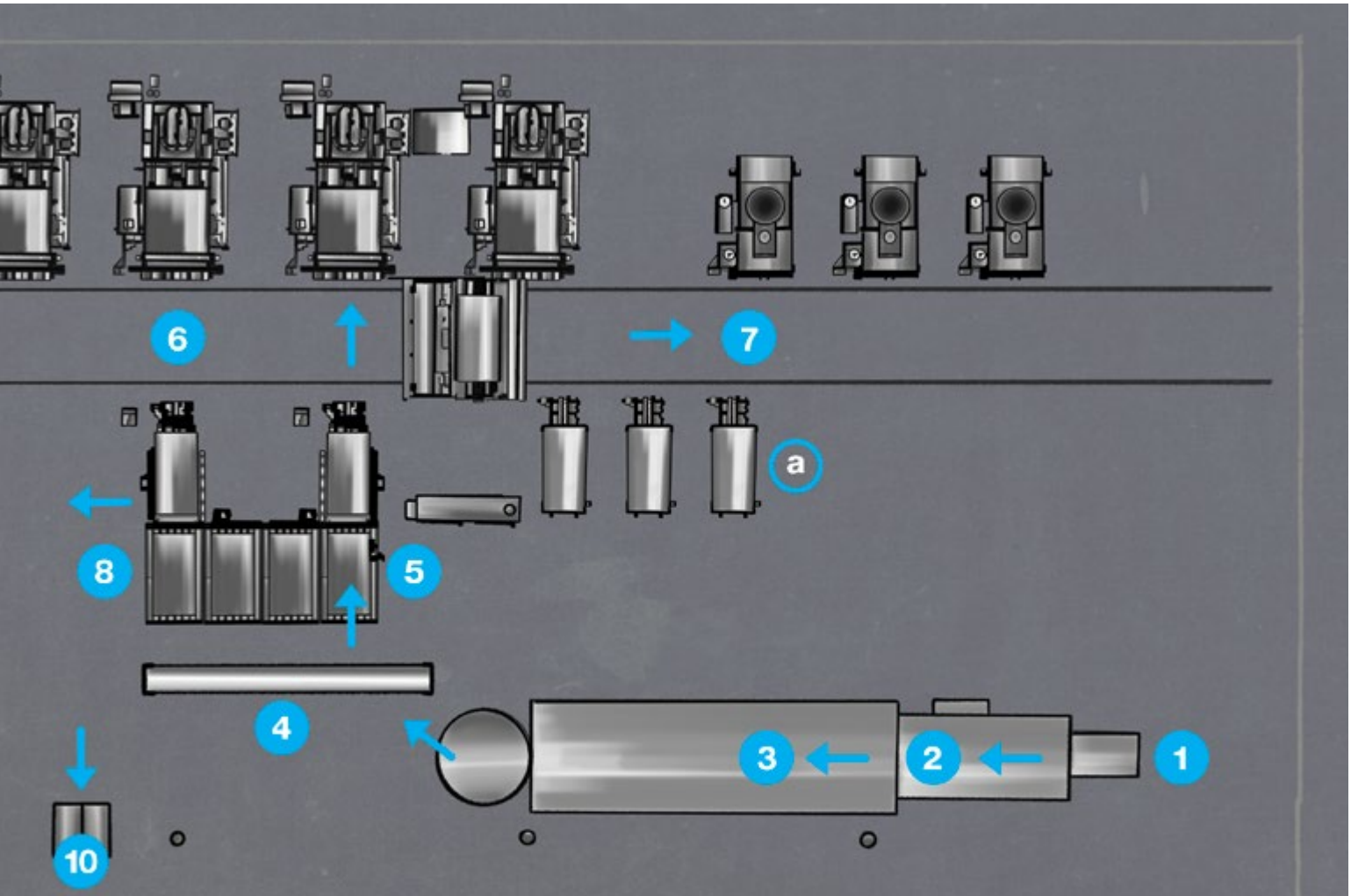
"The unique aspect about Feintool's heat treating operation is that we can control every part of the process, including the temperature, ramp-up, soak time, cool-down, and the gas we use," said Todaro.

"We can also use the most advanced technology and the latest techniques to create the best product possible and stay ahead of our competitors."

"By integrating the process, we can deliver the highest quality at the most competitive cost," added Reich.





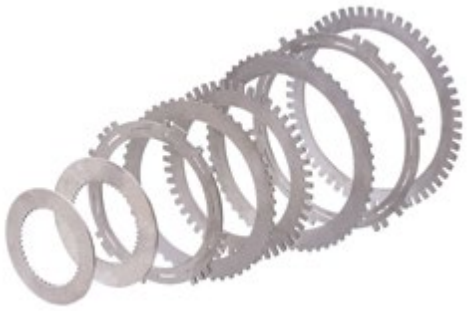


3) Wash / Dry
4) Load Fixture
5) Load Base Tray
6) Heat Temper Furnace 1, 2, 3, 4
7) Cooling Stations
8) Unload Base Tray
9) Vibe
10) Inspect & Pack
a) Staging Tables
c) Dry Coolers

In addition to manufacturing a flatter, more durable, higher-quality product, owning the heat treating process also enables Feintool to control its inventory levels better, reduce lead times, and allows for the flexibility to react to customer order changes to support just-in-time delivery.

A CONTINUED COMMITMENT

Feintool is committed to delivering the highest quality products to its customers. Delivering on that commitment means continually innovating and looking for ways to produce better components, faster and at the best value. Incorporating the heat treating process into its vertically-integrated fineblanking manufacturing operation is one way the company can strengthen its capabilities to not only meet but vastly exceed its customers' expectations.



See Feintool's heat flattening process in action at: **https://www.youtube.com/watch?v=nK7KOIQ_GA4&t=61s**

HARD MILLING REPLACES HAND GRINDING IN FINISHING DIE COMPONENTS

A focus on repeatability, geometric capabilities and speed led this manufacturer of fineblanking machines and components to embrace hard milling as its go-to finishing process, eliminating hand grinding.

Reprinted from Modern Machine Shop, Eli Plaskett

How far can hard milling go? Hard milling's uses in moldmaking and other high-precision tooling work is well-documented. It skips time-consuming steps like EDM or hand polishing, saving time and money. However, a leading hard milling application is demonstrated by the die-production process at Feintool, where milling even seemingly slight details that once would have been hand-ground has proven vital for realizing repeatability in some of the most precise metalforming tooling. Feintool both manufactures and operates machines for the forming process known as fineblanking. For this company, hard milling has replaced essentially all hand-work operations, and the company is looking at replacing jig grinding as well.

A FINE WAY TO MAKE PARTS

One of the rarer processes that manufacturers come across, fineblanking is a precision die-cutting and shaping process for making high volumes of parts, often with complex structures. Unlike standard blanking, fineblanking dies have rigid cutting edges with 0.5% clearance between the edge and workpiece, 10 times more precise than that of standard blanking. According to Feintool Executive VP of Sales and Marketing Lars Reich, "The precision and

"Hard milling set skilled toolmakers free from perhaps their most difficult and time-consuming chore."

rigidity of the process enables fineblanking machines to produce thousands of parts per day with excellent flatness, 90-degree edges and excellent dimensional accuracy, with most parts needing no post-processing."

During a fineblanking cycle, a decoiler feeder unit slides the coil material into position, and a triple-force hydraulic press clamps it into place. Once clamped, the "punch" pushes the blank into the die, which both shapes and shears the metal, stamping a finished part in a matter of seconds. The finished part is then removed, and the machine continues through its next cycle. The process is so controlled that the company's contract production facility in Cincinnati, Ohio, where it produces parts for customers at rates of tens of thousands per day, has none of the repeated hammer-blow sounds characteristic of stamping, even though the forces are similarly high. This Cincinnati site is also where its diemaking operation using hard milling is located.

Because fineblanking is such a niche operation, Feintool both manufactures the dies and operates the machines on behalf of its customers. The automotive industry has been a major source of work for the company, as modern vehicles require numerous small components with exacting specifications in their engines, transmissions and other systems. "The SUV boom was a major source of growth," Mr. Reich says. "The second- and third-row seating systems require many fineblanked parts."

Why seats? The gear systems in modern seat-recline adjustment mechanisms have components with enough fine teeth to accommodate around 200 possible seating positions. Machining a part with such fine details and exacting specs at the volume needed for automotive would be cost prohibitive, and stamping would rule out such fine detail, but fineblanking offers a way to mass produce these precise parts at relatively low cost. "Fineblanking really excels when complex, three-dimensional parts need to be produced at high volumes," Mr. Reich says. Referring to a part like the seat-adjustment component, he says, "We produced a 6-millimeter part at a rate of 50 per minute at a cost of $0.80 each, with $0.40 of that in the material."

The fineblanking machines can consistently produce enormous volumes of precision parts to some extent because the die is engineered to be modular. Precisely machined steel components that range in hardness from 62 to 64 HRC fit together in the die to provide the shaping and cutting forces. As components wear over time, the company can replace them with new or refinished pieces to ensure the precision of the fineblanked parts. The ongoing refurbishing of components is part of the nature of fineblanking, and it speaks to why a repeatable method of making tooling — more repeatable than hand finishing — is so valuable.

REPEATABILITY, GEOMETRY, SPEED

"We opted to move to CNC hard milling for three reasons," says Beat Andres, operations manager for tooling at Feintool. "Repeatability, geometry and speed. Speed is the least important of these benefits." Repeatability was the major draw, as changing out die components means trying to make an exact match to the original. If one of a dozen

Fineblanking is a precision die-cutting and shaping process for mass producing complex parts. The process is tightly controlled to produce parts needing little or no finishing.

The dies used in fineblanking are modular, with the individual components assembled after hard milling. This enables Feintool to replace or refinish individual components rather than the entire die as it sees use over time.

This part was made through fineblanking. The process produces complex parts in a matter of seconds.

Moving to hard milling essentially eliminated all hand work for Feintool's die components. This drastically improved the repeatability of the process when it came to reworking or replacing die components.

components is off by a few microns, it will ruin the part.

Before investing in hard milling, die components were finished by hand grinding, most notably for hand chamfering the leading edge. In addition to being slow, hand work for this vital detail introduced an opportunity for human inconsistency to affect the die. "The chamfering could take all day, which could take a physical toll," Mr. Andres says. "It was a pain. After two straight hours, you had trouble seeing." Hard milling not only mitigated that error, it set skilled toolmakers free from perhaps their most difficult and time-consuming chore.

The second most important benefit was the range of geometries that were only possible through CNC modeling and cutting. "To fine-blank complex pieces, we needed to be able to make dies in geometries that required three-axis milling," says Jens-Uwe Karl, VP of engineering. "Our customers' advancing needs simply made methods like EDM unfeasible."

Speed, though less important than expanding the company's ability to manufacture more complex parts with greater repeatability, was still a major draw. Before switching to CNC milling, the company used EDM to manufacture hard die components. EDMed surfaces needed to be hand-ground during post-processing.

Hard milling eliminated both EDM and this hand finishing, with additional time savings won by reducing the need to stop production because of inconsistencies in the die.

DOING IT THE HARD WAY

The first CNC machine Feintool bought for hard milling was at its Japanese facility. "Our facility in Japan was physically close to Makino, which enabled that team to work with Makino to develop a process," Mr. Karl says. "Once they had developed the process, we were able to replicate it in the U.S."

Feintool now uses a suite of Makino V33i three-axis milling machines for hard milling. "The V33i has a 30,000-rpm spindle with core cooling, plus core-cooled guides," Mr. Andres says. "The cooling systems eliminate thermal expansion, helping to guarantee high repeatability." The company opted to invest in three-axis machines rather than five-axis ones, as the fixed beds provide more rigidity. The high accuracy and repeatability of the machine tool combined with dimensional stability enables the tool room to run parts unattended overnight and through weekends with confidence.

On Makino's recommendation, Feintool uses a flood cooling method with a dielectric cutting fluid in place of water-based coolant. This has doubled the lifespan of its carbide ballnose cutters. To eliminate runout, it uses Haimer shrink-fit tooling. "We do everything possible to ensure the repeatability of the process," Mr. Andres says. "The rigidity offered by shrink-fit tooling is part of that."

Feintool chose to use the Makino V33i for its suite of hard milling machines because its rigidity and thermal consistency provided a high degree of repeatability.

"We have found that more effective milling upstream has power to deliver downstream results."

The hard milling process also uses magnetic workholding, which not only speeds and simplifies setup, but also maximizes hard milling capacity by allowing room for more die components on the machine table. To ensure repeatability with this system, Feintool invested in highly accurate probing capabilities that enable the machines to quickly locate parts on the plate with accuracy.

Machining cycles are long, particularly with the tiny 3-millimeter ballnose end mills routinely used to machine precise features. Therefore, non-contact tool probing is also vital to applying hard milling effectively. In the event of tool breakage, the machine automatically returns to its position from a previously saved state before switching out tools. Once it returns the tooling to that position, it makes passes over again to ensure it cuts the parts to spec. This safeguard is essential for unattended machining.

The choice of cutting tools is the one element of Feintool's process the company is reluctant to discuss. Much of its process development effort has focused on finding, evaluating and optimizing parameters for cutting tools that perform well in its application. "Picking cutting tools, like everything else in this process, is all about experience," Mr. Andres says. "No one cutting tool company has everything, which is why researching which supplier has the right cutting tool for each given need we have is so crucial."

While hard milling has replaced all hand-finishing processes, the company is still not done. "The next step is jig grinding," Mr. Reich says. He is confident they will do away with this operation. "We have found that more effective milling upstream has power to deliver downstream results, and we are still learning how far those results can go."

Using magnetic workholding enables the toolmaker to set up multiple components in each machine. To maximize machining time, the machines run overnight, assisted by automatic tool changers and in-process measurement systems.

Feintool has put a great deal of effort into sourcing cutting tools for hard milling. Cutting tools are sourced from different suppliers after extensive research to ensure the toolmakers are using exactly the right tools for each application.

CULTURE VS. STRATEGY

WHAT DEFINES GLOBAL CHAMPIONS?

by Yannick Schilly, *President & CEO – Altix Consulting Inc.*

"Culture eats strategy for breakfast."

– PETER DRUCKER

Much has been written on the subject and importance of corporate culture; its significance is undisputable. In fact, a recent research project of Duke University (Durham, North Carolina) revealed that 92% of North American executives believe that improving corporate culture increases corporate value and 84% recognize the need to improve their corporate culture.

WHY? WHY DOES CORPORATE CULTURE MATTER? COULD CULTURE BE MORE IMPORTANT THAN STRATEGY?

Culture is a broad and complex topic deeply rooted in the cradle of humanity; in the history of countries, organizations or individuals. Having worked across various continents has taught me early on that culture matters a lot. After all, our world is made of very different geographic cultures, languages, foods, arts and traditions which greatly influence our way of life, religion and beliefs, politics, economics, business performance and pretty much everything in-between.

Countries like Egypt and China can trace their rich history and cultural evolution back thousands of years, while others have more recent histories like here in the United States of America.

All of them, however, encompass marvels of beauty in arts and literature, all have specific strengths and weaknesses, and together they form a wonderful diversity and complementarity.

While we can see and describe with precision the high-level aggregate of macro-cultures, it is more difficult to describe and articulate with precision a corporate culture as each corporate culture is unique in character, identity, psychology and personality of each individual.

While the corporate world invests billions of dollars a year worldwide on corporate strategy – much less is invested in corporate culture. Is it less important? Is it less tangible? Is it more complex?

Corporate culture is comparable to an iceberg – only it's smallest part is visible at the surface, ninety percent of it is hidden under the water.

Among the visible elements we can name:

- Organization structures
- Institutions of corporate governance (Board of Director, CEO, Management team, …)
- Policies and business processes
- ETC.

Among the invisible elements we can name:

- Values
- Beliefs
- Norms
- Stories

- History
- Unwritten rules and codes
- Traditions
- Influencers and informal power structures
- Corporate “micro politics”

The upper segment tells us how the organization performs ideally, while the lower parts tells us how the organization really performs. Sometimes the gap is small, more often the gap is more significant.

Culture evolves with the organization over time, often outliving generations of leaders. Leadership can be close to the organization like a founding family member or their descendants or can be outside of the organization like a professional manager. This already outlines a first, very important dimensional difference between strategy and culture: time and chronology. Culture spans over a much longer period of time than strategy.

Strategy often looks at a time range from 2 to 5 years depending on the regions of the world and the cultural environment (longer term orientation in Asia – shorter term orientation in North America). Culture, however, accompanies and evolves with the organization over long periods of time. Mercedes Benz, Coca Cola or Procter & Gamble have defined their corporate cultures over decades, sometimes centuries.

Corporate culture, as a combination of the collective knowledge, history, shared memories and stories, traditions, beliefs, successes and failures, legends, builds the entire collective behavior and psychology of the enterprise. Like in sports – this is an absolute essential dimension which can easily make the difference between winning the game or losing the match! Strong athletes know that they need to cultivate body and mind with the same attention.

WHILE BEING DETERMINANT ON WIN / LOSE PSYCHOLOGY – IT GOES BEYOND!

Strategy gives the organization clarity of direction. How will we achieve our goal? It responds to all areas of investment in R&D, sales and distribution, human resources and product supply footprints. Culture on the other hand, determines the lanes for management and employees of what to do and what not to do, what is right and what is wrong. It will determine if the organization will be filled with positive energy and creative attitude in the best case, or toxicity and destructive attitude in the worst case.

The role of the captain / the leader / the CEO is essential. The leader will influence the culture significantly and help shape the future of the organization positively or negatively. The leader will unite or divide the employees of a company or the citizens of a nation.

The actions of individuals will be influenced in their decision making as it will impact:

- Which character traits / personality attributes are hired and valued
- What risk appetite is acceptable for the organization (calculated risk taking vs. cowboy/gambling attitude)
- Code of conduct, ethics and compliance
- Corporate social responsibility and corporate citizenship
- Short- and long-term strategies / decisions / actions and planning.

Numerous corporate failures are directly linked to scandals where top management closed an eye on core guiding principles and accepted fraud – Enron, WorldCom or more recently giant automobile manufacturers with gas emissions or major aerospace companies on product safety. In fact, culture determines to a large extent the future and well-being of an organization. Culture defines whether key initiatives will succeed or fail. Culture more often defines if M&A transactions will happen or not (other than the price of a transaction) and when M&A integration fails it is often linked to improper cultural fit, which may go undetected during the due diligence.

Can culture be influenced or changed? What about a cultural transformation – does that exists?

The most important step with any evolution, revolution or transformation is to gain a good understanding of a starting point and status quo – in other words, a diagnosis or assessment of the current culture.

An assessment is usually triggered by unforeseen events or a crisis, like the current Covid-19 crisis which can lead to a major economic crisis, or

“Culture is what people do when no one is looking.”

– HERB KELLEHER

a change in leadership or a capitalistic transaction like a merger or acquisition. Change is often triggered by a catalyst or change agent and it can be externally or internally driven.

Once the current culture has been assessed, it is important to define a specific target and to clearly formulate the attributes of the company's ideal cultural environment. This often comes with a deep reflection of the core set of values and leadership guiding principles the organization wants as guiding rails or lanes supporting decisions along the journey – the organization's psychological "swim lanes".

Leading cultural transformation is a long-term process, it is not a matter of weeks or months – it´s a journey. Such transformation needs focus and attention from top management and cannot succeed without the full commitment from the CEO. The captain's role is absolutely critical. In addition to the CEO, the leadership team must buy into the journey of change, or it will fail. A clear assessment of who is on board and who is not is imperative, and all must be committed to make the necessary adjustments. Failure to do so will backfire and add toxicity and politics in the workplace, thereby, undermining any efforts to change the culture in a positive direction. The leader will need to rely on additional key players and team members to become cultural champions and cultural ambassadors. They will soon become the lighthouse for all others!

Culture matters greatly because it impacts everybody in the organization from the top engineer in R&D, to the operator of the CNC machine. People are the most important asset of any organization. People need to feel that the company they work for will offer them a positive learning environment and growth opportunity. They need to feel trust, care, respect and security. They will better succeed in a fair and reliable system of reward, accountability and consequence. When a company culture favors a system of nepotism and biased decision making, employees may compare their workplace to a shark-infested sea where their goal will be to survive, instead of striving. It will only be a matter of time before the best employees will jump ship and seek more nutritious grounds to help them flourish with other employers.

Employees who feel valued and respected will take very good care of all business matters and ensure customer satisfaction. Culture to a large extent defines the brand and reputation of the organization. It can lead to extra-ordinary accomplishments and innovation like we see with Apple, it can also lead to fraud and scandals like we have seen with Theranos. These companies' respective founders and iconic leaders played an instrumental role in the future of their organization; Steve Jobs created one of the most successful brands in the world, Elisabeth Holmes, on the other hand, razed Theranos to the ground.

The entire cultural equation applies to organizations of all sizes from small to large, and the leader's commitment to corporate culture must be unwavering. General Electric was a champion of Lean and Sigma for many years, but it will have to re-invent and re-establish a culture of mastery and professionalism to ensure long term value creation.

The same applies for every high-perform organization – a nation, a sports team, a company or a musical orchestra. The careful selection of leadership and key players, as well as the definition and application of values and guiding leadership principles will make or break the organization. So yes, culture does eat strategy for breakfast – every time! And I'd like to leave you with a final quote from Lou Gerstner:

"Until I came to IBM, I probably would have told you that culture was just one among several important elements in any organization's makeup and success — along with vision, strategy, marketing, financials, and the like... I came to see, in my time at IBM, that culture isn't just one aspect of the game, it is the game. In the end, an organization is nothing more than the collective capacity of its people to create value."

— Louis V. Gerstner, Jr., Former CEO of IBM.

PRACTICAL TIPS FOR DEVELOPING A WINNING CULTURE:

1. Make sure the selection of the Captain/CEO is right
2. Lead by example and be a role model
3. Ensure consistency among the chain of command and the entire leadership / management organization
4. Corporate values are clearly defined, documented and communicated
5. All employees are able to name those values at any time
6. Do not tolerate cultural "offenders"
7. Identify cultural "ambassadors" among all areas of the business, within and outside the management rank
8. Communication and story telling become strategic management tools
9. Celebrate success and reflect openly about failures
10. Develop a lifelong learning organization attitude
11. Define right and wrong and provide a clear behavioral track
12. Define leadership guiding principles and invest in leadership training
13. Culture is a journey (infinite) and not a project (finite)
14. Ensure goals, objectives, risk taking, and strategies are in line with the culture
15. Perform a regular dialog about culture and listen to the organization, read between the lines.

Let's redefine what it means to be strong.

AWD systems and advanced
transmissions disc carrier (hub)

Together, we can. From our line to yours, Feintool delivers precise, repeatable parts, through the world's most advanced vertically integrated processes. Featuring fineblanking, forming, machining, double-disc grinding, deburr-and-wash and more. We're more than parts. We're a partnership. **Because nothing is stronger than the power of us.**

feintool.us/power

FEINTOOL

EXPANDING HORIZONS

ACHIEVING HIGH QUALITY NET SHAPE PARTS AT LOWER COST THROUGH FINEBLANKING TECHNOLOGY

To stay competitive, manufacturers have to balance production speed, part quality, and manufacturing costs. Automotive manufacturers, in particular, are under tremendous pressure to increase volume and reduce costs—especially on high-volume and high-precision parts—which has them looking for ways to increase efficiencies without sacrificing quality.

One manufacturing method that achieves this balance is fineblanking. First introduced in the 1920s in Switzerland, fineblanking produces high quality, precision parts with little-to-no secondary processing. Feintool has pioneered advances in fineblanking technology and turned it into the scalable and cost-effective production technology it is today.

Modern fineblanking achieves the net shape tolerances of a machined process with the cost structure of a stamping process.

Manufacturers that develop high-volume complex parts are taking a closer look at fineblanking because its speed and precision can reduce cycle times and produce a better product “off the line” compared to other methods, such as stamping and milling.

The automotive industry is a significant market for fineblanking, where it is used to manufacture over 200 different components for traditional vehicles. Aside from the automotive sector, fineblanking is also used for medical devices, tools, capital goods and power generation.

WHAT IS FINEBLANKING?

The fineblanking process is a hybrid way to form metal by combining stamping and cold extrusion technologies. In contrast to conventional blanking, the fineblanking process involves three forces—closing force, counterpressure, and blanking pressure. Combined, these three forces can produce parts with a flatness on the order of 0.001/inch and a sheared edge not possible when using a conventional metal cutting or punching process.

Here is how it works. As the tool closes, pressure embeds the impingement v-ring into the stock, preventing movement away from the punch and ensuring a smooth edge. The blanking punch advances, fully shearing the part. Simultaneously, counter punch pressure holds the part firmly against the face of the advancing blanking punch. This maintains flatness and enhances the sheared edge, eliminating die break or edge fracture. As the tool opens, the slug is ejected, the raw material advances, and the cycle repeats.

Fineblanking produces clean, right-angled, crack- and tear-free blanked surfaces; the part itself is straight and, because of the way it is clamped, perfectly flat. Parts can be manufactured fully-formed and net shape ready for immediate use, generally without the need for secondary processes. As a result, fineblanking provides the option of combining cutting and forming processes in progressive tools in a single press run. This ability allows cost-efficient high volume production of technically highly complex multi-functional parts.

"Modern fineblanking achieves the net shape tolerances of a machined process with the cost structure of a stamping process."

Fineblanking is integral in producing the fine teeth and tight tolerances required for these state-of-the-art double row seat recliners. Fineblanking is used to produce 30 million of these units each year in North America.

Fineblanking yields parts with the following characteristics:

- Precise, smooth, crack- and tear-free surfaces
- Excellent flatness to 0.001/inch
- Forming and deburring (if needed) in the same process
- Tight tolerances on positional and dimensional accuracy (which can be held to +/- 0.001 inch on parts up to ½-inch thick)
- Hardly any finishing required (net shape)
- High cost-efficiency
- Perpendicularity/edge squareness and minimal taper of the walls in top and bottom surfaces. This characteristic is essential if the walls are functional bearing surfaces or fine teeth need to engage over the full material thickness to reach required strengths.

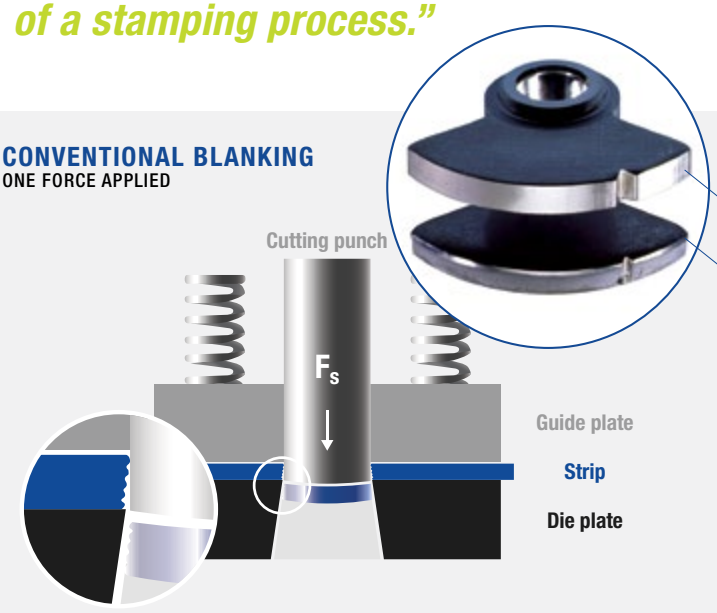
FINEBLANKING BENEFITS

Fineblanking offers manufacturers a variety of benefits compared to other manufacturing methods, including greater cost-efficiency, better quality, and improved productivity. Specifically, manufacturers can experience:

Reduce costs by eliminating secondary operations:

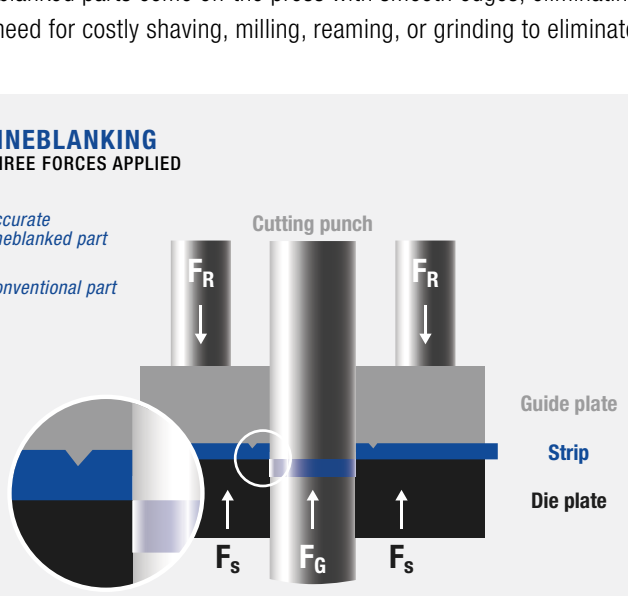
Fineblanked parts come off the press with smooth edges, eliminating the need for costly shaving, milling, reaming, or grinding to eliminate

CONVENTIONAL BLANKING
ONE FORCE APPLIED



Conventionally blanked components have sheared surfaces with a cut portion and a fractured portion. Component flatness is limited.

FINEBLANKING
THREE FORCES APPLIED



The vee-ring force FR and counterforce FG clamp the material securely before the cutting force FS is used. This results in clean, right-angled, even components, featuring the often desirable work hardening effect on the functional surfaces.

Latest generation 8800-ton fineblanking press running two-out clutch plates with up to 60 strokes per minute.

"The cost of fineblanking is more economical today than ever before. On average, fineblanking becomes cost-effective at an annual output of about 30,000 parts."

diebreak. Fineblanking presses can also pierce small holes and create thin web sections while stroking the original part. This ability eliminates the need for secondary drilling and machining operations and produces more consistent parts.

Faster cycle times:

Manufacturers can add identification marks and surface imprints, coined sections, self-rivets or contact points, countersinks, counter-bores, semi-pierces, cam tracks, and other features in the same stroke that blanks a finished part. With no additional machining required, manufacturers can produce more parts faster.

Produce more consistent part runs:

In fineblanking, tool punches and die plates are straight-sided. Resharpening of the tools never changes the part size, so clearances and tolerances remain the same on the first part to the millionth part. Fineblanking parts maintain tight accuracy across the entire production run.

Material flexibility and stronger parts:

Manufacturers can fineblank parts from a variety of materials, including carbon, alloy, stainless steel, aluminum, brass, bronze, and copper alloys, giving them more material flexibility. Parts fineblanked using rolled stock are stronger than those produced via casting and powdered metal. Multi-cavity solutions (several parts per stroke) and smart nesting provide the most economical material usage with minimal scrap.

HOW FINEBLANKING CLUTCH PLATES HELPS AUTOMOTIVE OEMS BALANCE SPEED AND QUALITY

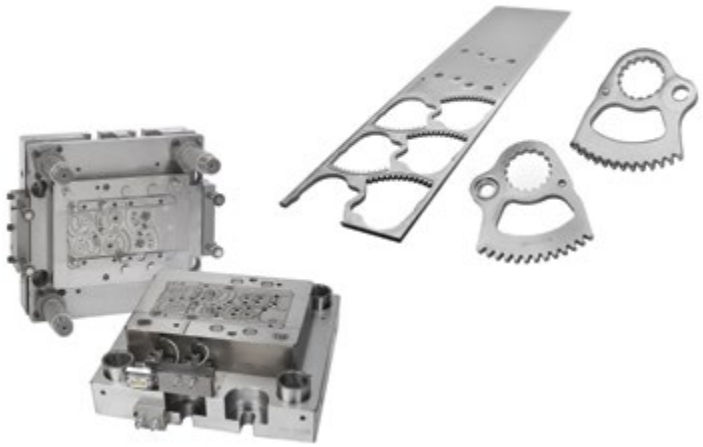
To meet automotive manufacturers' growing need for lightweight and ready-to-install drivetrain components, Feintool implemented a fully integrated, flexible manufacturing cell to produce clutch plates for automotive transmissions. The high-volume system runs from the coil to finished, ready-to-assemble products in one continuous operation.

The production system can produce high-precision clutch plates at a speed of 40 to 60 strokes, or up to 120 parts per minute. This process generates significant savings on the individual component cost compared to a regular fineblanking process, due to the increased output.

This integrated system optimizes material usage but also creates parts with perfect flatness, tighter tolerances, and repeatable Ra finish quality. The ability to go from a fineblanked clutch plate to a finished product on one continuous operation, with minimal manual labor, speeds up production and reduces component costs by 20%-40%.

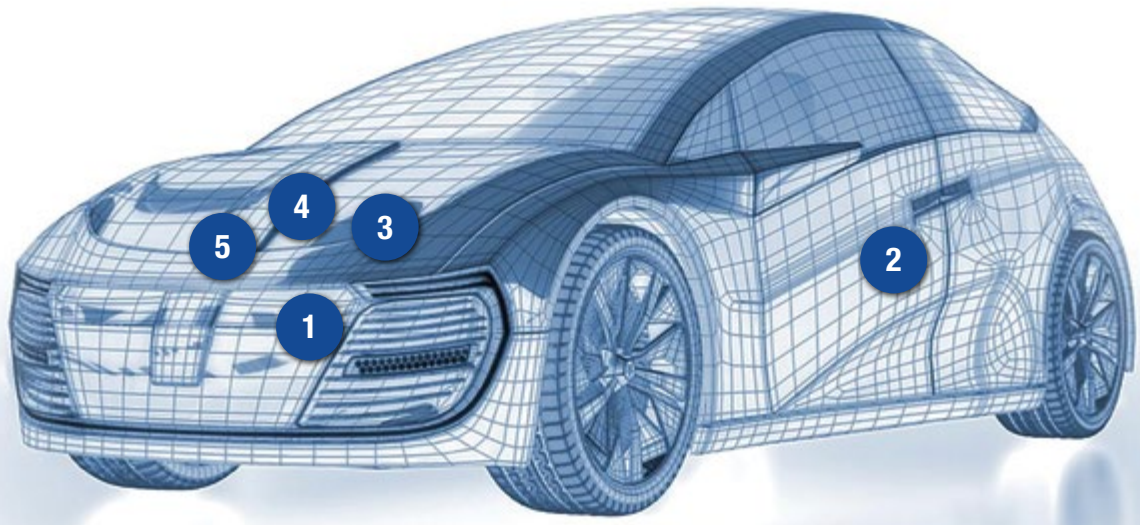
CONCLUSION

Manufacturers are looking for ways to reduce production times and costs while still keeping quality high. Fineblanking delivers the speed of conventional stamping and the accuracy of a machining process, but with increased quality and lower costs. With advances in tooling and technology, fineblanking is an ideal solution for companies that have ambitious targets for the series production of complex parts.



Using advanced multi-cavity dies such as this, manufacturers can efficiently fineblank parts, optimize material usage, minimize scrap and reduce costs. At right: seating height adjustment and strip.

A WORLD OF POSSIBILITIES



2

SEATING MECHANISM

Toothplate

Extruded Center Chimney – crack free out of high strength steel

3.5mm SAE 10B21

3

TRANSMISSION PROPULSION

Parking Pawl 12mm thick

Net shape, 100% fineblanked finish, safety component

12mm SAE 5120 – heat treated

1

ELECTRIC DRIVE

Endplate Ring

Fineblanked / formed in Aluminum

3mm 5052 Aluminum

2

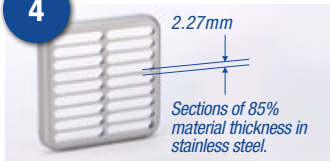
SEAT ADJUSTER

Toothplate

Degree of forming and fine tooth details

4.3mm SAE1018 – heat treated

4



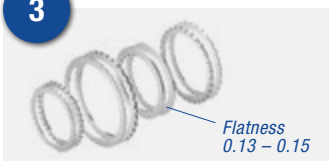
THERMAL HEAT EXCHANGER

Heat Exchanger Header

Narrow sections in stainless steel

2.7mm 3041 stainless steel

3



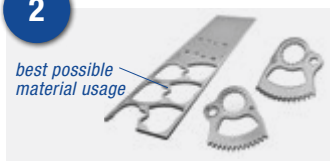
TRANSMISSION PROPULSION

Clutch Plates

Flatness, perpendicularity fineblanked finish

0.9mm – 12mm SAE 1008 1050CR, HRB 80 – HRC 28

2



SEATING HEIGHT ADJUSTER

Height Adjuster and Strip

2-out multi cavity tooling for best usage of raw material

6mm – 4140 – heat treated

5

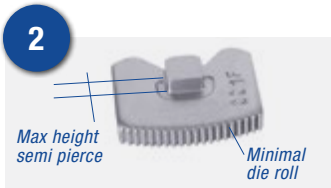
ENGINE VARIABLE VALVE TIMING

VVT Sealing Cover

Countersinks formed in the fineblanking tool

4.4mm SAE 1008

2



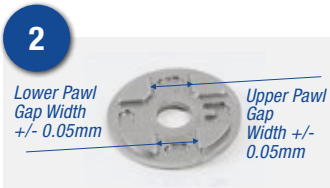
SEATING MECHANISM

Seat Recliner – Pawl

Minimal Die Roll – Height Semi Pierce

3.7mm SAE 10B21 – heat treated

2



SEATING MECHANISM

Seat Recliner – Guide Plate

Tight tolerance on Pawl Gap after heat treatment

4mm SAE 1018 – heat treated

DISC CARRIERS –

FORMED TO PERFECTION IN 12 STEPS WITH IN-TOOL ROLLER TECHNOLOGY

1600-ton direct servo press with moving bolster and automated slug loader.

Automotive transmission technology plays a crucial role in vehicle performance, fuel economy, and passenger comfort. The introduction of eight-, nine- and ten-speed transmissions has spurred the need for more complex metal-formed sheet metal parts that meet the automotive industry's standards of quality, precision, and cost.

Feintool's Nashville, Tenn. plant is meeting this need head-on. The plant has made significant investments, boosting its capabilities in metal forming and combining large tonnage, extended table direct-drive servo technology on its forming presses with state-of-the-art in-tool roller tool technology.

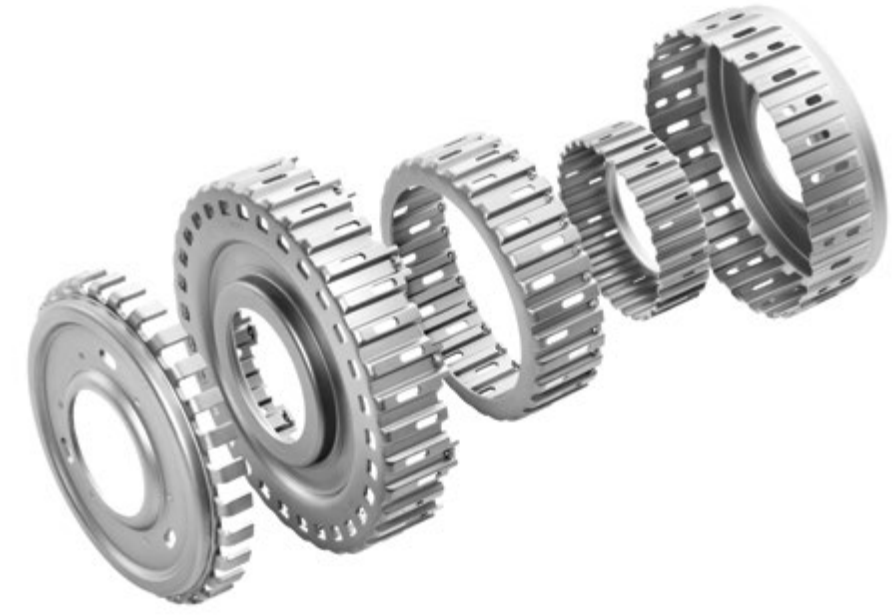
These investments give Feintool the ability to form high-quality components in a single tool run and at lower costs compared to other machining processes.

ADVANTAGES OF IN-TOOL ROLLING

The commercial advantages of in-tool rolling technology, compared to traditional "out of tool" secondary forming processes, such as flow forming, are significant when volume exceeds 100,000 pieces a year.

The flexibility of the cold forming process enables Feintool to form and finish transmission components, as well as other parts, in a single press run. Since no secondary processing is required, Feintool can produce the components quicker and at a lower cost.

In-tool rolled components also offer technical advantages compared to secondary forming processes. The forming rolls surround the components, and all of the material is formed at the same time. Using up to three rolling stations, Feintool can form and calibrate the components resulting in tight run-out and profile tolerances.



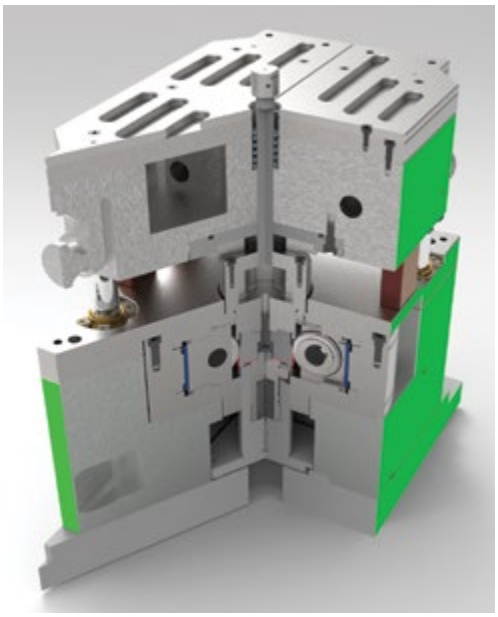
Rolled to perfection in-tool rolled disc carriers.

PART OF A COMPLETE SYSTEM

The roller tool technology is at the heart of a system developed by Feintool to produce ready-to-assemble components in a single press run.

Advanced direct-drive servo press technology with a large 18-foot press table gives component designers a lot of flexibility. The press can accommodate up to 12 tooling stations in a single run. Simultaneous operations, including deep draw, rolling of the tooth geometry, snap ring grooves, oil holes, and cutting to length, leads to lower component costs.

A 3-axis CNC-controlled transfer system guarantees a quick transfer of the components through all tooling stations. Positional accuracy and speed of the transfer system is the key for



The cross-section shows one of the crucial in-tool roller stations. This is part of the 12-station disc carrier transfer tool Feintool designed and built to produce a complex transmission component for a U.S. gearbox manufacturer.

Roller die – at the core of the technology are forming rolls – arranged in pie-shaped cassettes encapsulating a part 360 degrees.

"In-tool roller technology forms complicated disk carriers in a single press run, resulting in higher quality and low-cost components."

LARS REICH, EXECUTIVE VICE PRESIDENT SALES AND MARKETING

unleashing the stroke rate capabilities of the direct-drive servo press.

The moving bolster, which allows quick die changes within 20 to 30 minutes, is another important feature of the press system. The servo press is equipped with two moving bolsters that alternate move to the front or back of the press. The entire tool, including transfer arm and all the sensors for parts detection, can be set up outside of the press on this spare moving bolster.

When a tool change is required, the moving bolster can be swapped, and the machine is back in production with minimal interruption.

Feintool's state-of-the-art in-tool roller technology provides quality, precision and cost advantages that are ideal for automotive transmission components.

TWELVE STEPS TO PERFECTION

1 Blank from coil

2 Pre-draw

3 Finish draw

4 Cut flange, form top, cut pilot center hole

5 Pre-roll tooth geometry

6 Roll tooth geometry

7 Calibrate tooth geometry

8 Cut length, cut 9 x 32 mm oil holes

9 Cut length, cut 9 x 32 mm oil holes

10 Cut center hole

11 Cut 9 x 3 mm oil holes, coin burr in center hole

12 Cut 9 x 3 mm oil holes

LEADING AUTOMOTIVE OEMS AND TIER SUPPLIERS PARTICIPATE IN FEINTOOL SYMPOSIUM

Feintool US Operations held its annual customer symposium in Cincinnati in October 2019. Leading automotive OEMs and Tier suppliers gathered to gain perspective and learn how to enhance productivity amidst an environment of increased global competition, disruptive technologies, tariffs, and labor disputes.

Day one included a series of informative presentations on automotive economic trends, best practices in Lean manufacturing, increasing speed and part quality through enhanced quality control, and Cincinnati's history of innovation.

On day two, participants were able to see Feintool's manufacturing, secondary operations, and quality capabilities up close through plant tours.

Customers were highly complementary. They shared comments, including:

"Great presentations. I particularly liked the Lean presentation."

"I always enjoy getting a glimpse of where the marketing is heading, and the economic presentation helped me do that."

"The QC presentation was informative, and the Cincinnati Innovation presentation was fun."

"Christoph's Feintool presentation gave me a better understanding of Feintool's breadth of capabilities."

Making 1 million parts a day to support American manufacturing.

Together, we can. From our line to yours, Feintool delivers precise, repeatable fineblanking and forming parts through the world's most advanced, vertically integrated processes. With over $130 million investment in U.S. operations over the past decade Feintool's commitment to your success is unwavering. We're more than parts. We're a partnership. **Because nothing is stronger than the power of us.**

feintool.us/power

FEINTOOL

EXPANDING HORIZONS