

THE **COLD FORMING** ADVANTAGE

PRODUCTIVITY IMPROVEMENTS IN SPLINE-ROLLING

SPLINE ROLLING EXCELLENCE

ONE TOOL

ONE GRIND

\$18,000*

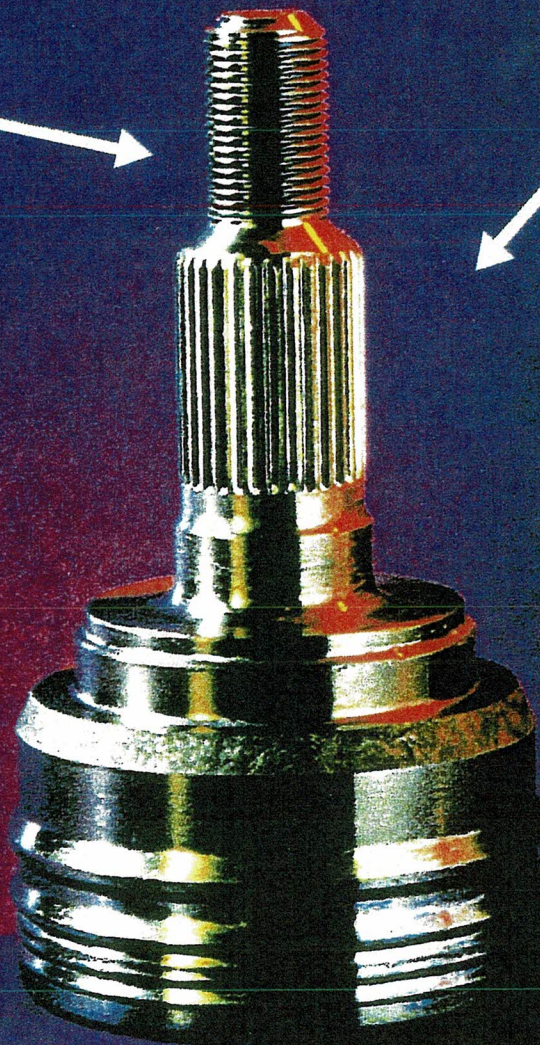
\$78,000*

M24 X 2.0MM THREAD
CLASS 6G

331 24/48 DP
45° PA SPLINE
CLASS 5
WITH HELIX ANGLE

COST PER PIECE
.0013¢

COST PER PIECE
.0017¢



* DOCUMENTED RECORDS OF TOOLS IN MACHINE ALMOST ONE FULL YEAR AND REMOVED ON 8/15/97
* COST PER PIECE CALCULATIONS DO NOT INCLUDE THE 8-10 TOOL CHANGEOVERS THAT WERE ELIMINATED

CALL COLD FORMING TECHNOLOGY
AND SEE HOW WE CAN HELP YOU REDUCE YOUR COSTS!



COLD FORMING TECHNOLOGY, INC.

6556 Arrow Drive • Sterling Heights, Michigan 48314

Telephone 810/254-4600 • FAX 810/254-4944



North America's Leading Spline and Thread Rolling Specialists

Spline & Thread Rolling Fundamentals

Materials

Most Carbon & Alloy Steels Can Be Roll-Formed
AISI 1020-9310.....300M.....AISI 303 and 410 Stainless

Hardness

0-35 Rc(Best at 18-20Rc)

Pre-Roll Diameters

+/- .001" On Threads
+/- .0005" On Splines

N.D.P.

12 to 96/128 (Subject To Design Review)

Number Of Teeth

Minimum 11.....Maximum 300

Pressure Angles

30.....37 ½.....45

Length of Rolled Splines

.25".....7.5"

T.I.R.

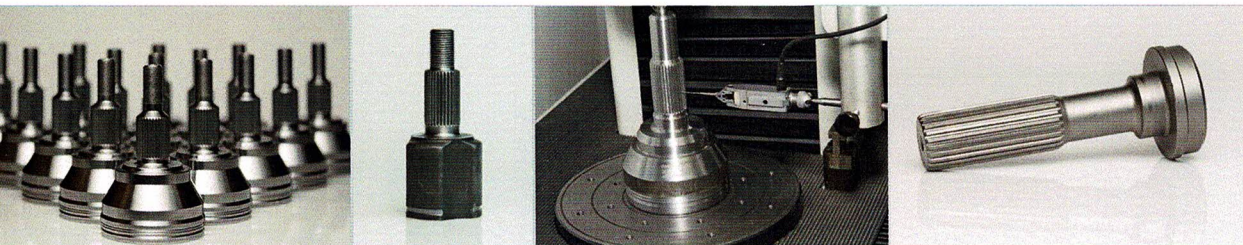
.001" Max



COLD FORMING TECHNOLOGY

North America's Leading Spline and Thread Rolling Specialists





We'll Help You Roll Your Own...

Driveline Designers, Manufacturing Managers, And Production Coordinators

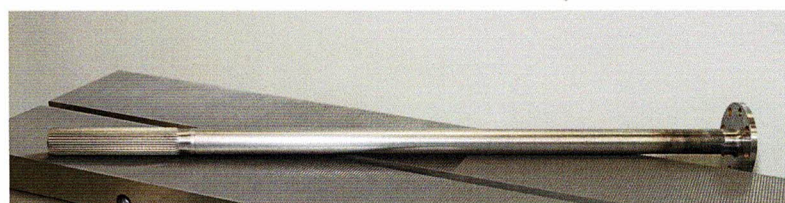
Automotive, Construction, Agriculture, All-Terrain, Racing and other industries rely on the full-service capabilities only Cold Forming Technology, Inc. provides. From assistance with Product Design, Tools, Prototypes, Pre-Production, Production Rolling, Service Parts and Emergency Rolling, your needs can be fulfilled at one location.

Cold Forming Technology Rack Rolling Tools consistently provide the most accurate and cost-efficient parts for OEMs, Tier One, Tier Two or other independent driveline parts manufacturers. We offer new and regrind tools up to 72" in length.

For Twenty-Three Years, Cold Forming Technology has been regarded by our clients as knowledgeable Gear Tool Designers with the expertise and history to minimize start-up costs and reduce costly production errors.

The Cold Forming Technology Prototype Department provides the groundwork and innovation to develop the tools needed to ensure a successful start-up for full production. With over three-hundred sets of "stock tools" initial costs can be minimized in most cases.

- Involute Splines
- Threads
- Oil Grooves
- Boot Grooves
- Serrations
- Helical Involute Splines
- Worms
- Tapered Splines



Tools

CFT provides the highest quality **new** and **reground** precision rolling racks.

Prototypes

The CFT Rapid Response program produces parts that are made complete in "days" to include material purchase, turning, rolling, grinding, heat treating, inspection and shipment with documentation to ensure quality, precision parts.

Pre-Production

Cold Forming Technology rack tools can be pre-approved for production and ultimate in-house use to run customers' pre-production needs for capability studies, dynamometer tests and to supplement any delays in new or rebuilt machine deliveries to ensure a smooth transition into production. Parts can be P-Papped while production set-up is underway.

Production Rolling

Customers rely on CFT to roll production quantities of parts when they don't have their own rolling machine(s), there are spikes in volume, they can't break into production to run service parts, they have the in-house capability to turn parts but can't afford to buy a new or rebuilt rolling machine or they are at capacity limits.

Emergency Rolling

Many driveline parts manufacturers now specify Cold Forming Technology, Inc., as their primary backup source for spline rolled parts in the case of an unexpected catastrophe or other unusual situations. With a bank of spline rolling machines, we can provide emergency rolling three shifts a day to ensure continuity of production for both yourself and your customers.

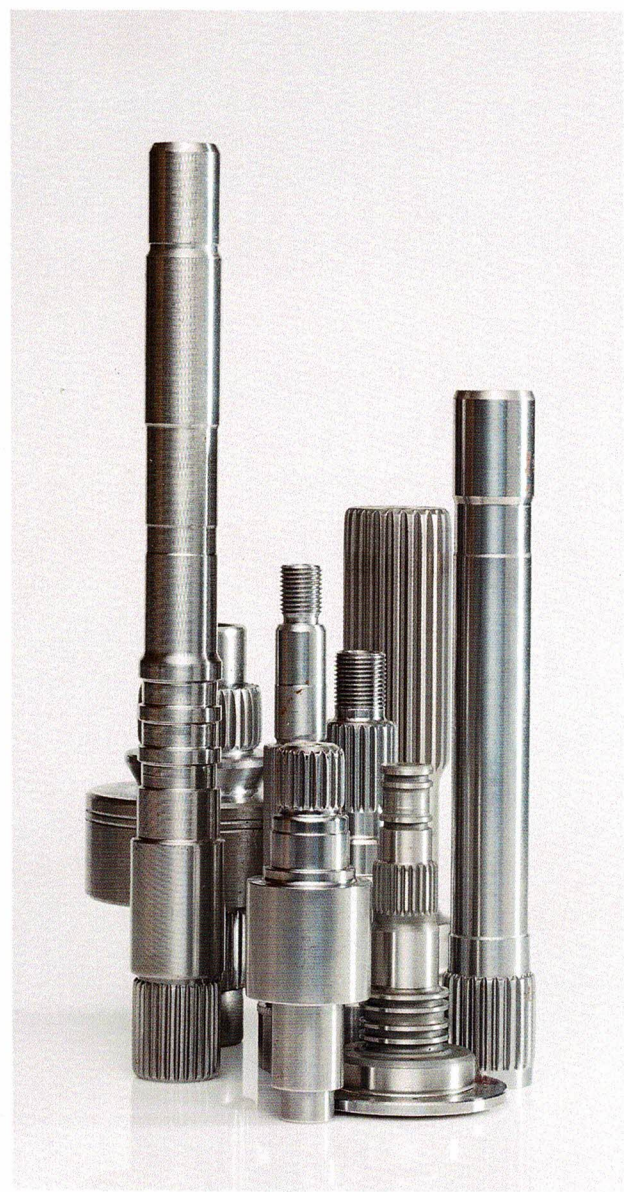


Production Rolling, Prototypes, Emergency Rolling

For parts that require spline or thread rolling, leverage our comprehensive technical know-how and innovative solutions.



...Or We'll Roll 'Em For You!



Why Choose CFT

Companies with lathes/turning machines can now quote and supply their customers who require parts with rolled splines, threads or other forms.

Capacity Limits

When you're at capacity and need additional volume.

Service Parts

When you need to run service parts but can't break into production.

Volume

When your overseas unit needs more volume.

Costs

When you can't afford to buy a new or rebuilt rolling machine.

Machine

When you don't have spline rolling machinery but do have the ability to turn and process, we will roll the splines and you do the turning.

Short Run

When you don't know how long your job will last and can't justify investing in new machinery, CFT will do the rolling for you.

Value Added

When your primary customer dumps an extra job on you and you don't know anything about spline rolling, CFT will deliver product on time and on budget.



**OUR PHILOSOPHY IS SIMPLE:
AGGRESSIVELY PURSUE OUR
CLIENTS' GOALS, EMPHASIZE
LEADERSHIP IN UNDERSTANDING
OUR CLIENTS' BUSINESS,
PRODUCE THE BEST QUALITY
TOOLS AS WELL AS PARTS AND
DELIVER THEM RIGHT THE
FIRST TIME.**



GEARSolutions®



A Case Study COLD FORMING TECHNOLOGY, INC. & WEST MICHIGAN SPLINE, INC.

As featured in the July 2015 issue of
Gear Solutions Magazine



WEST MICHIGAN SPLINE, INC.

Cold Forming Technology, Inc., and West Michigan Spline, Inc.

Cold Forming Technology, Inc., and West Michigan Spline, Inc., chose to lead by example and show what happens when two similar companies opt for collaboration instead of competition.

By Anna Claire Howard

INTRODUCTION

John Donnelly, president of Cold Forming Technology, Inc., and Gary Hill, president and owner of West Michigan Spline, Inc., are known around the Rochester- and Lake Michigan-areas as collaborators in the spline rolling industry. However, getting to that point wasn't easy. It took a great deal of trust building and a willingness to work together to get to where those two companies and the men behind them are today.

CHALLENGES

Cold Forming Technology, Inc.

Cold Forming was founded by Donnelly and his team of fellow gear machine and tool manufacturing veterans in Sterling Heights, Michigan, in 1992. Initially, its mission was to provide customers with high-quality spline and thread rolling tools to meet the growing demand for increased tool life and cost savings. With more than 20 years of experience behind its founders, it was able to accomplish this while providing outstanding tool performance.

Shortly after opening shop, Cold Forming's spline and thread rolling tools outperformed their current competition by improving tool life by 40 to 80 percent, and some by as much as 1,000 percent. Cold Forming began to expand into areas Donnelly and his team were already familiar with from their previous experience in the industry, including automotive, off-road, farm equipment; anything that required a drivetrain.

Following a period of expansion into industry segments in which the team was highly experienced, customers began asking to have custom prototypes made. This function quickly grew to encompass roughly 40 percent of Cold Forming's current business.

Eventually, high customer demand for rolled parts led the company to consider building and

selling spline rolling machines. They had the required knowledge and expertise, but such a shift would be a significant undertaking. It would require a completely different set of resources. The decision was made to remain in the tool industry and stay out of the machine business.

"We knew we didn't want to be machine tool builders again with the ramifications of that — needing the bigger plant, experienced engineers in machine design, electrical people, hydraulic people, and a team of machine builders," Donnelly said. "Building spline-rolling machines would require all of that. But, what we did have was the expertise in grinding of precision tools. We felt that spline rolling and thread rolling and the other types of rolling were all very complimentary to what we had done in the past."

West Michigan Spline, Inc.

Hill started West Michigan Spline in 1987 after spending his career as a service engineer and a research and design manager. For more than 20 years, he acquired intimate knowledge of the spline rolling industry, received patents on tool designs, and directed the design of the machines themselves. However, after years of battling his previous employer over creative and innovative differences, he was confident he could build a better machine — in both design and function — and that he could convince axle shaft manufacturers to buy his new concept.

Hill's mission was to build spline and thread rolling machines that would alleviate dangerous and difficult situations often associated with tool changes. This came from a work-related injury that befell Hill early on in his career.

"In the late '70s, I was installing some spline racks into a spline roller," Hill said. "I had a very big rack in my hand — a 48-inch piece of steel — and I actually crushed my hand against a tie bar. I ended up with a really big cut, cut

tendons, and was in a cast for about a month. That inspired me to get rid of the tie bars in a spline rolling machine all together."

His vision was to create a spline rolling machine made without tie bars. Instead of expensive castings, it would use a weldment that could accommodate the growing demand for increasingly larger and longer tools while remaining just as rigid as castings, if not more so. This idea materialized in the form of a weldment that could be easily modified to accept changes and can be delivered sooner and is more competitive.

However, as spline lengths got longer, part diameters got larger, and hydraulic forces increased so did the need for longer, larger tools reaching up to 72-inches in length. Hill needed to accommodate these changing needs.

His solution to his customers' demands was to apply a gap-press-like base structure that resembled several gap press frames tied together with his welded construction. "If you look at the end of the weldment machine, there are many ribs inside of it that look like a gap press and the letter C," Hill said. "There can be 10 or 20 of these ribs inside of a machine. The middle two are very wide. In standard machines, these are six inches wide, and on the 72-inch machines, they're 12 inches wide."

In other words, the strength comes from the gap press frame, and they're all tied together with the rest of the weldment to perform as a spline roller.

Need for Collaboration

Selling tools and machines for major automotive programs generally requires the machines and tools are a part of the entire package.

West Michigan Spline only sold machines and had to buy their tools from Hill's competitors. This was not a desirable position to be in.

COLD FORMING TECHNOLOGY, INC.

Donnelly joined National Broach and Machine Co., Inc., in 1968 and was appointed as president in 1983. During that time, and through 1985, National Broach was a part of Lear Siegler, Inc. Thinking that the company was for sale, Donnelly and a few of his partners vied to take the company private through a leveraged buyout. Lear Siegler agreed, and National Broach was theirs.

However, in 1987, Donnelly and his partners were approached by a company based out of the United Kingdom, and they agreed to sell.

That's when Donnelly and his partners set their eyes on the spline-and thread-rolling industry.

"Lear Siegler was always encouraging acquisitions," Donnelly said. "Along with internal growth, they encouraged you to make acquisitions. We knew the spline rolling field was complimentary to all of the gear tools we were making. We were the world leader in what we did then — helical gear broaching, shaving cutters, honing tools, grinding machines, etc.. Adding spline rolling machines and tools would have been a natural compliment what we were already doing."

Throughout his four years owning the company with a couple of internal partners, Donnelly made direct overtures for a direct acquisition to get them instantly into that spline rolling field. They didn't have any intentions of selling the company, but when it did happen, they were all in their late 40's and too young to retire.

However, Donnelly realized his desire to get involved with a business

in the machine tool industry on a much smaller scale than National Broach and to have that business to include spline and thread rolling.

Industry leaders at the time had grown complacent. There was no pressure for them to increase tool life and reduce costs. Donnelly seized that opportunity. Cold Forming's time had come.

So, Donnelly and his team started buying equipment. The demands for increased tool life, cost savings, and better quality were necessary to help customers compete in the growing world markets, and Cold Forming was prepared to meet those needs.

The company's next phase involved customers requesting to have parts made that required rolling of the spline as opposed to having it hobbled or shaper cut since they could handle the preliminary operations on their own. Donnelly and his team at Cold Forming obliged to this demand. Soon, they were getting rolling orders in for anywhere between 500 and 10,000, and they were able to turn those around in a couple of days due to the large number of spline rolling machines they had available. This led to their ability to serve customers in emergency rolling situations where orders as high as 200,000 had to be filled.

It wasn't long before Donnelly and his team at Cold Forming were faced with a dilemma — do they continue to grow their tooling business and start designing rolling machines?

Donnelly decided that Cold Forming needed to be the best at what it did and grow in the tool business. So, he left the machine-side of it to Hill at West Michigan Spline, Inc.

On the other hand, Cold Forming only sold tools.

Cold Forming had the resources to methodically acquire equipment and begin promoting their new ideas in spline rolling tool manufacturing. West Michigan Spline, which concentrated on rebuilding all makes of spline rolling machines, was on its own with few resources and growing ideas for innovation. Now, all they needed was a collaboration to take their businesses to the next level as spline-rolling industry leaders.

"The buyer is always looking to minimize his effort and control responsibility," Donnelly said. "They would always prefer to buy his requirements from the fewest possible vendors."

When West Michigan Spline was not working with Cold Forming, it had to purchase spline and thread rolling tools from its competitors. According to Donnelly, Hill was "on the short end of things when it came to the tool delivery schedules, pricing, and, possibly, even quality."

Essentially, Hill's competitors were able to provide the entire package of both tools and machines, thus taking full responsibility and giving them a competitive advantage over West Michigan Spline.

Cold Forming was at a similar disadvantage because it did not manufacture spline and thread rolling machines, even though they were a supplier of the finished parts during the prototype and pre-production stages.

The concept of the buyer wanting sole responsibility for the machines and the tools was the impetus for Donnelly and Hill's partnership. Prior to their collaboration, both Cold Forming and West Michigan Spline were at a disadvantage because Hill only sold machines and Cold Forming only sold tools. Both Donnelly and Hill needed a partner to meet the demands of their customers. They found that partnership and collaborative benefit in each other's companies.

METHODS

Essentially, Donnelly said he believed West Michigan Spline made the best machine, and Cold Forming Technology made the best tools. Being that their shops were roughly 150 miles apart from one another, it seemed like it would be a natural fit for the two to create a partnership.

However, having been gear machine tool builders, Gary wasn't quite convinced that Donnelly and his team at Cold Forming would not eventually become his next competitor.

"Cold Forming was making automatic loaders for spline rollers," Hill said. "I wasn't in the tool business, and they were courting me because I had to get my tools and racks somewhere. So, we all put our cards on the table. I said I wasn't going to do anything until the production of automated loaders stopped and until I felt that I could trust them."

A year or so went by, and Cold Forming wasn't letting up with their desire to partner with West Michigan Spline. Hill began to feel confident that Donnelly wouldn't infringe on his business. Cold Forming stopped making automatic loaders and began sending business Hill's way. Hill started doing the same for them. The two even shared an exhibitor booth at a trade show. Before long, the two companies were promoting each other.

"It slowly evolved after many discussions that this was the direction we needed to go," Hill said. "Being partners would promote both of us. It was just a matter of time and them not doing anything in the machine tools part of it—tools, yes; machines, no."

The issue of trust doesn't come up anymore, and Hill's relationship with Cold Forming is stronger now more than ever.

"We may be covering different customers at the same time, but whenever we hear about a

new program, automatically we notify him and go to bat for him completely,” Donnelly said. “Conversely, it’s the same way with what Gary does for us. He does new and rebuilds. He’ll rebuild anybody’s machines, but when that opportunity comes up, he’ll only use our tools.”

For Hill, his main focus has been building and sustaining communication efforts between his shop and Cold Forming.

“Cold Forming is in markets I don’t serve, and I’m in markets they don’t serve,” Hill said. “I build the machines, and we go all over the world. Those communications include new customers and new avenues of getting into existing customers. Cold Forming hears more about those types of things because they’re in the tool business whereas when we install a machine somewhere, we typically don’t hear from those people again unless something goes wrong or until the next go-around when we build them another machine.”

RESULTS AND BENEFITS

Today, this partnership has helped both companies grow to be industry leaders in spline- and thread-rolling, among other things.

Cold Forming has become a leading supplier of splines, shafts, and other tooth forms while also providing production rolling for customers who are proficient in turning and producing short-run and service rolling for those who can’t afford to break into production. They are the “emergency supplier” for companies that require any volume of production during machine breakdowns or other unexpected calamities whereas West Michigan Spline is the go-to company when these calamities happen with services and parts and the knowledge on how to resolve spline rolling issues is required.

Eventually, each company’s growing reputation and commitment to service resulted in customers asking each company to expand into other areas.

For example, West Michigan Spline now produces facing and centering machines, which are both standard and to customer-specific designs.

As Donnelly and Hill began taking advantage of cross-promoting one another, the cooperative benefit became apparent — sales increased for both companies.

Cold Forming Technology continued to grow in its production of prototype shafts and other parts its customers were having delivery

WEST MICHIGAN SPLINE, INC.

West Michigan Spline, Inc., was created the same year as Cold Forming, but unlike Donnelly’s company, Hill didn’t have the team of experienced professionals behind him. Until 1991, when he hired his first employee, it was just Hill doing service consulting and design work by himself on a drafting table. However, as his company steadily grew, Hill remained committed to building spline rolling machines.

Hill knew that the loading of the larger 36-, 48-, and 60-inch tools was a difficult and often a dangerous situation that required hoists, cranes, or even fork lifts to load tools that could easily weigh a couple hundred pounds each.

He also knew that the industry standard tie bars that kept the machine from expanding during the rolling process were both unnecessary and burdensome to the machine set-up people when loading the larger tools.

Although the early industry designs for spline rolling machines were made from weldments, the industry standard was castings. The problem was that castings required costly modifications to the patterns for even the most minor of changes, which subsequently caused delivery delays and additional costs. That’s where Hill’s weldment idea came into play.

“Early in my career, a friend asked me to help him with a hydraulic press,” Hill said. “He was testing the press, and as I was standing back looking at the side of this press, I noticed he was taking big chunks of hard oak wood and just

crushing them. I asked him how much tonnage his press developed, and it hit me at that point that I needed to make a frame that emulated a gap press because gap presses develop a lot of strength to get that required tonnage. That was the basis and still is the basis of the welded construction that we have in the West Michigan Spline spline roller. It came from an idea I got in the press world.”

Hill decided to design and build spline rolling machines using welding construction that was just as rigid as a casting without including the tie-bars. This design, which can be easily modified, could be delivered sooner and was more competitive. It was a base structure that resembled several gap press frames held together with his weldment technology.

However, Hill was skeptical to jump into business with Cold Forming. He had been burned by larger corporations in the past, especially when it came to his ideas for gear manufacturing machines. In fact, one of Hill’s old employers worked at Cold Forming in its early days. He was weary of letting the past repeat itself. And, at the time, he wasn’t sure if Cold Forming would just end up being his next competitor.

But then, after years of communication and building trust and after his previous boss had left the company, Hill opened up to the possibility of a partnership with Cold Forming. The two even shared an exhibitor’s booth together at a trade show in Detroit. That was nearly 20 years ago.

and quality issues with as well as production rolling specialty parts. This expansion led to another area of growth — emergency spline rolling.

“Most medium- to high-volume spline-rolled-parts manufacturers are aware of the necessity for back up and contingency plans in case of an unexpected calamity,” Donnelly said. “It’s not unusual for us to spline roll tens of thousands of parts for our customers when an emergency arises to keep them in operation.”

While growing the company in these new areas, Donnelly and his team often hear of new programs before the machine builders did. Similarly, West Michigan Spline would often hear of programs that Cold Forming was unaware of due to its expansive customer history. Through their partnership of cross promotion, Donnelly and Hill both let the other know when new opportunities arise within the industry.

Hill’s machines have opened the doors for a larger array of parts that can be spline rolled due to the flexibility and cost-effectiveness of his weldment design. Parts that were previously produced through hobbing or shaper cutting can now be spline rolled, which allows the customer to save on overall costs and provides additional tooth strength. Additionally, Hill’s successful weldment design has allowed West Michigan Spline to expand into the centering and facing areas, which are complimentary to the entire shaft producing process.

CONCLUSION

Today, the cooperation between Cold Forming and West Michigan Spline — which includes promoting each other’s products and combining tools and machines from both shops to meet customers’ needs — has been going on for almost 20 years and has made both companies stronger and more competitive within the gear manufacturing industry. ■

Cold Forming Technology, Inc.

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West Michigan Spline Inc.

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