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Quality Wins.

CASE STUDIES

COST-SAVINGS

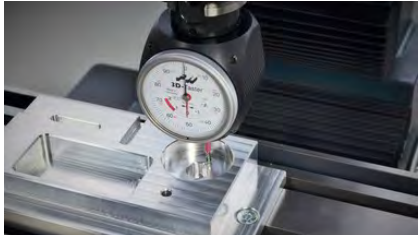
CYCLE TIME REDUCTION

IMPROVED ACCURACY

REDUCED DOWNTIME

LONGER TOOL LIFE

BETTER FINISHES



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Engine Manufacturer Saves \$250,000

What if you could save a quarter of a million dollars just by changing one thing in your production process? It'd be like winning the lottery, right? Well, that is exactly what happened to one of our customers, a major U.S. automotive engine production facility.



The Problem: Unplanned Tool Changes

The company was having an issue with what they designated “unplanned tool changes.” They defined this as any time a tool was stopped and replaced for any reason prior to realizing its life cycle. Whether form tools, boring heads or specialty tools, unplanned tool changes occurred 57% of the time for almost two years. Reasons for change included bad harmonics, inferior finishes, tool chipping or outright breakage.

The Reason: Unknown

A thorough investigation was undertaken to determine the root cause. Cutting tools, workholding and toolholders were all checked with no common findings. The only solution left was the drastic measure of reducing spindle speeds to reduce unplanned tool changes, which would obviously affect cycle times.

The Prime Suspect: Unbalance

The company soon spoke to Mike Martin, HAIMER Regional Manager for Michigan and Eastern Canada, who had consulted with and installed HAIMER balancing technology at another one of their facilities. After nearly two years attempting to resolve the issue, they decided to implement balance inspection to their pre-machining set-up process for a 6-month trial. Every tool assembly was given a defined balance specification on the print, such as G2.5 at 15,000 RPM, and that specification was inspected using a [HAIMER TD balancing machine](#) prior to any tool going into production. Any rejects were returned to the vendor for correction.

The Verdict: Huge Cost Saving and Improved Quality

After six months with the tool assembly balance inspection process in place, and no other changes in

the set-up process, unscheduled tool changes dropped from 57% to just 7%. The tooling cost savings over two production lines was over \$250,000 during the 6-month trial period. In addition, by removing vibrations, the balancing process improved machining accuracy by 12 microns on average. For this customer, the improvement in part quality alone merited the investment in HAIMER balancing technology. The improved part quality was priceless to the company’s management team, as it eliminated a multitude of issues downstream (in quality inspection and final assembly).

The Aftermath: Buying Into Balancing

While the company initially only balanced their form tools, boring heads and other specialty tools, they soon expanded implementation to their endmill assemblies as well. Vendors and suppliers, tired of receiving rejected tools back for correction, soon realized the importance of balancing, and its relevance to this automotive customer. Consequently, many of these suppliers working with this customer have now acquired their own HAIMER balancing machines.

By using a HAIMER balancer as a go, no-go gauge, not only was this major automotive manufacturer able to solve the persistent issue of unplanned tool changes, they saved over \$250,000 in the process. Nothing was put into production before balance inspection, and beyond the greatly improved tool life, they actually made a more precise part. What was once a big and costly unknown, became a clearly definable (and solvable) problem.

K&G Manufacturing Co. Finds Better Balancing

K&G Manufacturing Co., located just south of the Minneapolis-St. Paul area, has been in operation since 1937. You don't keep your doors open for 80 years without learning a few things about the machining business. One lesson the company learned long ago is that balanced toolholder assemblies are key to customer satisfaction.

Why Balance?

Unbalance is caused by uneven weight distribution of the assembly. The consequences are vibrations, run out, poor surface finish and shorter tool life. Speed intensifies these negative effects. Reducing spindle speed can lead to smoother cutting, but it also decreases metal removal rates and productivity.

K&G Manufacturing has found that only high-precision balancing of the complete tool assembly allows their high-speed machines to reach their maximum capability. Combining this knowledge with Industry 4.0 style best practice protocols helps them maintain their position as an industry leader.

The Process

To assure uniformity and the highest level of efficiency, all tools are prepared offline. Balanceable holders are combined with the tool in a centralized tool crib. The assemblies are preset and balanced offline while the machines themselves continue to run production. Balancing, which is generally done with weighted balancing screws, is always the last step in the process before the assembly is sent to the machine. Necessary offset measurements defined by the presetting operation are uploaded directly to the

machine control via the presetters built-in post processor, so operators don't even have to key in the numbers manually and risk entry errors.

Ramping Up Production

The company does a lot of work for some very challenging industries, including the high performance marine, military and aerospace segments. To keep up with the demand for their services, they purchased several new CNC machines with spindle speeds of 20,000 RPM. Because parts for their previous balancer were no longer available, and it was quite old, there was an obvious need for new balancing equipment.

"We looked at some other balancing equipment, but the HAIMER reps seemed much more focused on our needs," said Isaac Rupprecht, Tool Crib Coordinator for K&G Manufacturing. "We had the feeling this level of detail would turn into superior service and support after the sale. And we were right!"

A Whole New Balancing Experience

After installing a brand new [Tool Dynamic TD Comfort](#) Balancing Machine, it didn't take long for the company to recognize that all balancing machines are not created equal in terms of accuracy and ease of use.

Test comparisons between the old and new balancers showed that, while the numbers were close, the repeatable accuracy of the HAIMER TD Comfort was noticeably better. The Tool Dynamic had several features that were a vast improvement. For example, the fact that the HAIMER machine clamped identical to that of a machine spindle (clamping and drawing on retention knob) eliminated variations seen previously with the old unit. Be it CAT 40/50 or HSK63A, the HAIMER machine provided positive clamping that ensured precise and repeatable measuring accuracy. Deviations caused by misalignment or poor seating of



K&G Manufacturing Co. Finds Better Balancing (continued)



automatically calculated the correction needed and pinpointed the proper location for correction. Complete balance inspection and correction was achieved in less than three minutes, with the risk of human error reduced to zero.

The HAIMER Difference

How much difference did the HAIMER balancers make? The proof is in the pudding. An operator who had not been informed of the change in equipment was working on the first job after the switch. Unbeknownst to him the toolholder assembly had been balanced on the new Tool Dynamic. After the initial run, he was amazed by the resulting finish and went to the tool crib to investigate. With a balancing system from HAIMER, the improvement in finish

quality was so obvious, the uninformed operator could tell at a glance that something had changed.

Finish is Fundamental

The surface finish on aluminum components is a huge concern for K&G Manufacturing. In fact, many of their Aerospace customers utilize a provision on their prints called U.V.C. (Unusual Visual Condition). Basically, this allows a part to be rejected for any subjective determination including visual finishing flaws, casting discoloration, tooling marks, etc., even if all measurable part tolerances are within specification. K&G Manufacturing has seen fewer U.V.C. rejections since using the HAIMER balancing system.

Happy with HAIMER

“We promise our customers greater than 95% on time delivery and less than 200 DPM quality,” said Isaac. “HAIMER balancing enhances our ability to achieve both of those goals by reducing set up times and helping our operators get excellent results on the first run. The performance of their equipment is only matched by the after-sales support we have received since purchasing the HAIMER TD Comfort Balancer.”

the holder in the balancing spindle were eliminated.

It was the elimination of such deviations that brought unsuspecting operators to notice a key change in setup practices. They no longer needed to make additional compensations at the machine for bore sizes and roundness. Tools were, for the first time, cutting to size from presetter to machine. This eliminated additional compensation allowances and reduced set up time.

No Manual Math Required

The HAIMER software was also quickly found to be superior. While the previous balancer would indicate the grams of unbalance and its location, it did not provide any interface to help the user determine their options for correcting the unbalance and specific guidance on where to make corrections. In essence, it told them they were on the fairway, but did not tell them where the hole was or what club to use to get there. It took a lot of trigonometry and many test spins to get it right on the old machine. The Tool Dynamic, on the other hand, offered several balance correction options including rings, weighted balancing screws, drilling or milling. Once an option was selected, the machine

Imbalance - The Spindle Killer

One of our favorite (and best) pieces of advice for customers is that balanced tool assemblies save time, reduce costs and increase tool life. Yes, we do say it a lot, but that's only because we don't want shops to learn the lesson the hard (and expensive) way. But you don't have to take our word for it. Andy Joerg, owner of Custom Precision in Schaumburg, Illinois, relates why he brought balancing equipment into his shop.

A Bad Day at the Shop

Custom Precision manufactures components for the printing industry, medical device field, aerospace and automotive industries and more. In 2015, they were roughing out an aluminum block with a 2-year-old spindle fitted with a high end, "balanced," 20,000 rpm, Weldon flat holder, a 20-30,000 rpm indexable tool and a high quality pull stud. "To be honest, I thought I was good because I was buying "balanced" toolholders that were rated for those speeds," Andy said.

The machine was operating at 12,000 RPM with a feed rate of 225 IPM. After five or six hours running time, the operator noticed a change in the harmonics. Soon, oil started leaking out of the lower spindle gage followed by total spindle blowout. The total cost of the failure, including replacement of the unit and loss of production time (factoring in ten hour shifts for two days), totaled over \$8,000 (still relatively low compared to other systems which could be upwards of \$70K to replace).

A Lucky Meeting

The cause of the failure remained a mystery a year later when Andy attended the Method Machinery open house in Boston. By chance he met up with HAIMER Sales Representative, Mike O'Connor. After talking for a while, the subject of the spindle blowout came up. By this time Andy had a suspicion that balance was part of the problem. Mike immediately recognized a classic unbalance situation and confirmed that balance may indeed have been the cause of the spindle failure. After hearing the additional benefits of balance, Andy was convinced and ordered a [TD 1002](#) balance machine. Having a better understanding of balance also allowed Andy to see the value of HAIMER [Shrink Fit CAT 40 toolholders](#) and [pull studs](#), which provide an extremely rigid interface and inherently superior balance properties. This led him to additionally purchase a [Power Clamp Comfort](#) shrink fit system on the spot.



Blown Spindle

Numbers Tell the Tale

Back in Illinois, Andy was put in contact with Adam Soto and Rob Salley of our Technical Department. They put one of Andy's tool assemblies on the balance machine in our show room. It balanced at G56 at 20,000 RPM. It should have been G2.5. Without correction, the assembly was not certified to run any faster than 900 RPM!

Full Speed Ahead

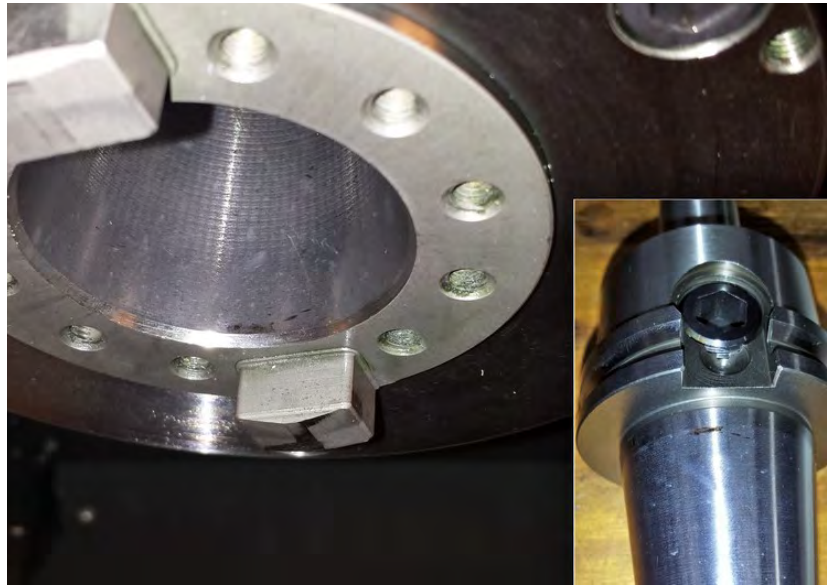
After Adam and Rob helped Andy set up his new balancing machine in his shop, the operator immediately noticed how much quieter the machine tool sounded

***Imbalance - The Spindle Killer
(continued)***

when it ran. “Without knowing the cause of the failure, we were more than a little concerned it would happen again,” Andy said. “Knowing the fully assembled holder is balanced, combined with the security of shrink fit toolholders, has allowed us to run at full speed with complete confidence. It’s one variable we don’t have to worry about anymore.” As a bonus, Andy also noticed an improvement in tool life and surface finish, and the machine is still running perfectly today

Passing Value to End Users

Custom Precision has a reputation of providing quality parts to its customers. The combination of HAIMER balancing and shrink fit products has allowed Andy to give them this high level of service more profitably.



Vibration scraped interior of spindle and caused wear on the taper of the holder.



Improvements in tool life and surface finish were an added bonus of balance.

Shrinking Costs - Collet Vs. Shrink

One Tooling Change Nets Automotive Manufacturer Big Returns

As featured in Modern Machine Shop, July 2017



How do you increase productivity and reduce consumable tooling costs without changing anything about the cutting tool itself? That is the story of Wecast Industries Inc., the world's largest manufacturer of cast exhaust manifolds and turbocharger housings for passenger cars and light trucks.

As a Tier 1 supplier to the automotive market, Wecast Industries specializes in the casting of complex high-temperature components for the passenger cars and light duty trucks. As a global leader in metallurgical development, Wecast Industries harnesses the knowledge and experience of its highly experienced team to deliver innovative solutions to their customers. They design and manufacture components including exhaust manifolds, turbo charger housings, integrated turbo manifolds and other specialized powertrain parts. Their commitment to employee engagement and innovation promotes an environment where continuous improvement is the daily norm.

When the concept of process improvement via toolholding upgrades came to Bob Phillips, Manufacturing Technician at Wecast's Macomb

Township location, he was happy to investigate a possible alternative. Bob noted, "I was looking for a way to get our machines running truer." It did not take long for him to implement a comprehensive, long-term testing platform from which Wecast would be able to evaluate the claims of one specific vendor.

The Proposal

The vendor was HAIMER; a global manufacturing leader of [shrink fit toolholding and machine technology](#). Mike Martin, Regional Manager for HAIMER USA, presented Bob Phillips with a proposal that would guarantee both increased productivity and tool life versus their current collet chuck holders. More specifically, he proposed reducing cycle time by 5% for all round tools with the guarantee that Wecast would net a minimum increase in tool life of 25% for all tools using his shrink chucks.

The Test

To test Haimer's assertions, Bob isolated one machining cell (8 machines) and five cutting tools to conduct a study. The part was cast iron exhaust manifolds. In four machines, the existing collet chuck

Shrinking Costs - Collet Vs. Shrink (continued)

Tool Life Savings

Chart 1

Tool #	Description	Tool Life (# of Cycles)		Tool Life Increase	Annual Tool Changes		Annual Tool Change Time (hrs)		Annual Tool Change Cost		Annual Savings (\$)	
		Collet	Shrink		Collet	Shrink	Collet	Shrink	Collet	Shrink	Labor	Tools
9	8x10mm Step End Mill	3000	3900	30%	153	118	18	14	\$ 408.78	\$ 317.94	\$ 90.84	\$ 944.30
11	11.1mm Step Drill	1000	1250	25%	458	367	54	43	\$ 1,226.34	\$ 976.53	\$ 249.81	\$ 12,103.00
19	8.6mm Step Drill	1000	2000	100%	458	229	54	27	\$ 1,226.34	\$ 613.17	\$ 613.17	\$ 30,457.00
25	8mm Pilot Drill	1000	1550	55%	458	296	54	35	\$ 1,226.34	\$ 794.85	\$ 431.49	\$ 13,392.54
27	5x8mm Step Drill	1000	1850	85%	458	248	54	29	\$ 1,226.34	\$ 658.59	\$ 567.75	\$ 19,418.70

Average Tool Cost: \$93.63

Annual Savings: \$ 1,953.06 \$ 76,315.54

Cycle Time Savings

Chart 2

TOOL	Description	Collet Cycle Time				Shrink Fit Cycle Time				% Difference			
		Machine 1	Machine 2	Machine 3	Machine 4	Machine 1	Machine 2	Machine 3	Machine 4	Machine 1	Machine 2	Machine 3	Machine 4
9	8x10mm Step End Mill	47.78	47.67	47.67	48.2	46.56	47.95	46.95	46.32	-2.50%	0.60%	-1.50%	-3.90%
11	11.1mm Step Drill	24.36	24.15	24.26	24.78	23	24.06	23.31	23.09	-5.60%	-0.40%	-3.90%	-6.80%
27	5x8mm Step Drill	32.45	32.45	33.47	32.66	26.75	28.13	26.34	26.1	-17.60%	-13.30%	-21.30%	-20.10%
19	8.6mm Step Drill	25.41	25.83	26.79	26.57	24.47	25.11	24.6	24.34	-3.70%	-2.80%	-8.20%	-8.40%
TOTALS:		129.99	130.1	132.18	132.2	120.78	125.25	121.2	119.85	-7.30%	-4.00%	-8.70%	-9.80%

Cycle Time Cost Savings

Chart 2B

Annual Cycle Time Hours	
Collet	Shrink
76,765	75,908
Annual Savings: \$ 16,989.44	

holders were left to run as usual, without changing cutting parameters. In the other four machines, [Haimer shrink fit chucks](#) replaced the pre-existing collet chucks with adjustments to feeds and speeds to generate the 5% improvement for each tool. During the following three months, data was carefully gathered as all machines continued operating across three shifts, six to seven days per week. Data including cycle times, tool life and tool change times were recorded.

Results – Tool Life

It only took a week for Bob Phillips to start seeing positive results, and after three months, the data was undeniable. As *chart 1* illustrates, improvements in tool life from the tools in shrink fit chucks were profound, achieving an average life increase of 60% across all five tools. Bob even noted, “We continue to see tool life continue to increase beyond the results recorded in our study.” Tool life, which was measured by the number of manifold pairs the tools could produce, increased anywhere from 25% to 100% depending on the tool. The annual cost-savings from the additional tool life on Wescast’s 16 CNC machine line, factoring direct and indirect labor costs as well as tool change savings, was \$78,269.

Common stigmas often associated with shrink fit chucks is that they are only for high speed machining, only for milling, or only for advanced work materials. Therefore, it is noteworthy to mention that all but one of the tools (a step end mill) were actually step drills, running at speeds less than 8,000 RPM in cast iron.

Haimer claims the significant increase in life is a by-product of their systems runout accuracy, balance integrity, taper accuracy and inherent ability to maintain the aforementioned properties from one tool change to the next. Drew Strauchen, vice president at Haimer USA notes, “The value of [Haimer shrink fit](#) lies not only in the high quality of our manufactured product, but also in the repeatable nature of the system itself. Shrink fit eliminates a lot variability encountered with mechanical systems, thereby improving process reliability for the user in both the short and long-term.”

Results – Cycle Time

The average cycle time savings for four machines using shrink fit chucks, versus their collet holders was 7.5% (see chart 2). Based upon annual part output, the total number of machining hours saved per year by using shrink fit toolholding was significant. Assuming a 40-hour workweek, and three shifts, this represents one week’s worth of saved machining time and an estimated additional savings of \$16,989.44 (see chart 2B).

In addition to the productivity gains, Bob made mention

**Shrinking Costs - Collet Vs. Shrink
(continued)**

Wescast also “saw indirect benefits via the simplification of the tool change process and through the elimination of cleaning processes associated with collets.” Timely collet cleaning processes and collet replacement schedules to help stabilize runout accuracy could be eliminated, and possible variations between how two people might replace a tool became non-factors with shrink fit chucks.

Results – Total Cost Savings & Payback

All total, switching from a mechanical collet chuck to shrink fit chucks produced an annual cost savings of \$95,258.04 for all 16 CNC machines.

The total investment to tool up all 16 machines on the line was \$56,064, with a great deal of the capital expense wrapped up in the cost of the shrink machine. The average cost of the shrink chucks by themselves was \$262, versus the average price of \$204 for the collet chucks, a difference of only 29%. Payback (see chart 3) on the investment would be realized in month six or seven of year one, with no significant future investments needed in subsequent years to maintain the tooling. This is because the life expectancy of the shrink fit system can be measured in years. The elimination of wearable mechanical components, such as collets, nuts, rings, bladders or other moving parts means no maintenance or replacement schedules need be instituted, saving further time and money.

In addition, open capacity on the shrink machine will enable other programs at Wescast to purchase shrink holders only, thereby shortening the payback period even further.

Perceptions Changed

As with anything new, perceptions often create skepticism in the beginning. Bob noted there was some apprehension, “At a glimpse, the shrink fit holders were not as bulky as our collet chucks, and the perception was that they would not be as rigid or secure as a result. Furthermore, we had not had success previously with another press fit clamping system, which had boasted similar benefits.” However, after thorough testing and documentation, the results made it easy for all involved to jump onboard. The goal of reducing costs via better toolholding technology was achieved, netting a savings that would be realized for this location as well as other Wescast production facilities in the future.

Written by Drew Strauchen, Vice President of Marketing and Business Development, HAIMER USA

Contributed by Bob Phillips, Manufacturing Engineer, Wescast Industries Inc.

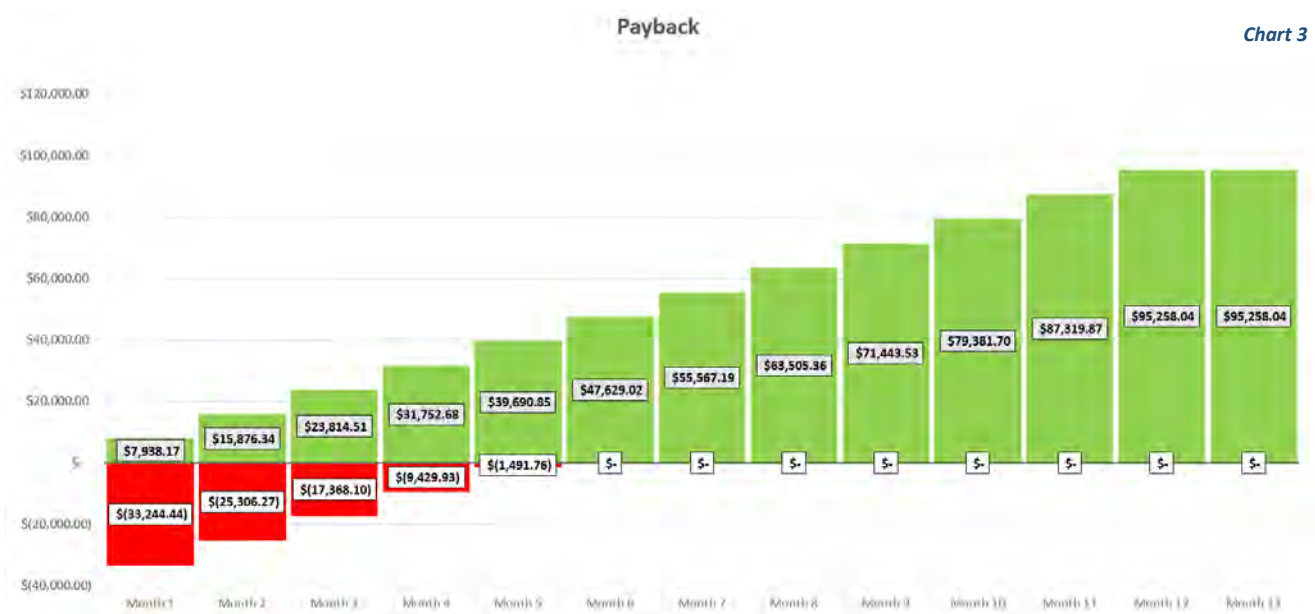


Chart 3

JD Machine Partners with HAIMER for Continuous Improvement

JD Machine, based in Ogden, Utah, has been providing its clients with high quality manufacturing services since 1979. You don't stay in business that long without a corporate culture that stresses a daily effort to strengthen every facet of the business for better results.

It was this search for continuous improvement that led the company to HAIMER. They were unhappy with the size capacity and reach of the units they had on the shop floor. They decided to make a wholesale change and invest in some high-speed machines with 20,000rpm spindles and a wide variety of toolholders. The machine tool dealer specified an HSK taper and highly recommended they look into a [shrink fit system](#), which led them to go shopping at IMTS.



Quality, Performance and Value

"HAIMER's reputation led us to their booth," said Chris Peterson, JD Machine's Director of Engineering, "but it was the wide range of machines they offered that really caught our eye. The other companies we looked at had one or two models. With HAIMER, we were able to select a model that gave us the performance we needed at a price that fit our budget." The engineering team was also impressed by the fact that HAIMER holders and shrink fit technology can easily shrink high-speed steel, something other systems can't do. A bonus was the elimination of cleaning processes for collets and torque specs for collet chucks or mill chucks. "We are not big fans of ER collets," said Peterson. "If we could, we would shrink everything." An Expensive Lesson on Balance

JD Machine turned to HAIMER again after a high-speed spindle failed. Since these units run into the \$25 to \$50K price range, this was unacceptable. Chris and his team did an extensive analysis on the situation. Their HAIMER toolholders were balanced, but they were using a variety of others that were not. The consensus was that balance was the probable cause of the failure.

"I don't think we fully realized the importance of balancing tools prior to losing that spindle and starting to scientifically study the reasons why it failed," said

Chris. "That situation made us realize: balancing is not a luxury – it's a necessity."

In general, if something doesn't look or sound right, most operators will slow down the machine by default. As a result, many shops are operating slower than they otherwise could because they don't have balanced tooling. "Since we installed the balancing unit, we've seen a much higher metal removal rate through improved speeds. The harmonics sound better so you feel comfortable to turn the machine up and push it harder. We also saw a big difference in the quality of finish."

Chris says there have been no spindle failures in the six years since JD Machining installed the [HAIMER balancing unit](#). He concluded, "We just didn't realize all the implications that balancing has on the applications we run. It even keeps us from eating up tools when machining titanium and also gives us excellent results with helical interpolation of holes."

A Long Term Relationship

As long as JD Machine continues its quest for better speed, quality and customer service, it is safe to say that HAIMER products will continue to be a part of the equation, thanks to their excellent service and the high performance of their products.

Balancing - A Key Component for OSG USA

One industry that certainly knows about the importance of quality, precision and productivity is the cutting tool industry. This incredibly competitive industry must balance (pun intended) demand for innovation with the challenge of producing cutting tools that are cost-effective for the end user. To do so requires the utmost efficiency and productivity. For OSG, a global leader in the manufacturing of premium cutting tools for the metalworking and composites industry, the pursuit of greater efficiency and quality in manufacturing never stops.

How Can We Improve Throughput

Many years ago, the reoccurring question of how to further improve throughput and machine utilization met with a conversation about balance. Vladimir Lazarevic, engineering manager at the time, met with HAIMER and some of the other production engineer's at OSG USA's Bensenville facility to discuss how one might help the other.

During the meeting, Brendt Holden, President of HAIMER USA laid out the benefits of balancing wheel pack assemblies, which included:

1. Longer wheel life
2. Improved surface finish on carbide tools
3. Reduced power consumption/load for longer spindle life
4. Ability to run faster speeds for increased productivity

The Test

As any good engineer does, Vladimir established a series of tests to conduct on the production line to properly evaluate HAIMER's claims. Several repeat wheel packs responsible for longer production runs were isolated for the test on two types of CNC grinding centers. Key analytics of the existing wheel packs were recorded, including wheel life, power consumption and surface finish quality. Next, new wheel packs were sent to HAIMER for balancing, and returned ready for production with total unbalance for each wheel pack assembly being well under the G2.5 specification at 10,000 RPM.

The wheels were placed into production, at the same speed and grinding parameters as before, and results were recorded during and after grinding.



Photo provided by Rollomatic

The Grinding Results

- Load: During grinding, power consumption on both grinding machine platforms decreased 18%.
- Wheel Life: The wheels were able to produce approximately 20% more tools due to less (and more concentric) wear.
- Spindle Life: OSG calculated spindle life increased 30%; thereby lowering maintenance costs and down time.

***Balancing - A Key Component for OSG USA
(continued)***

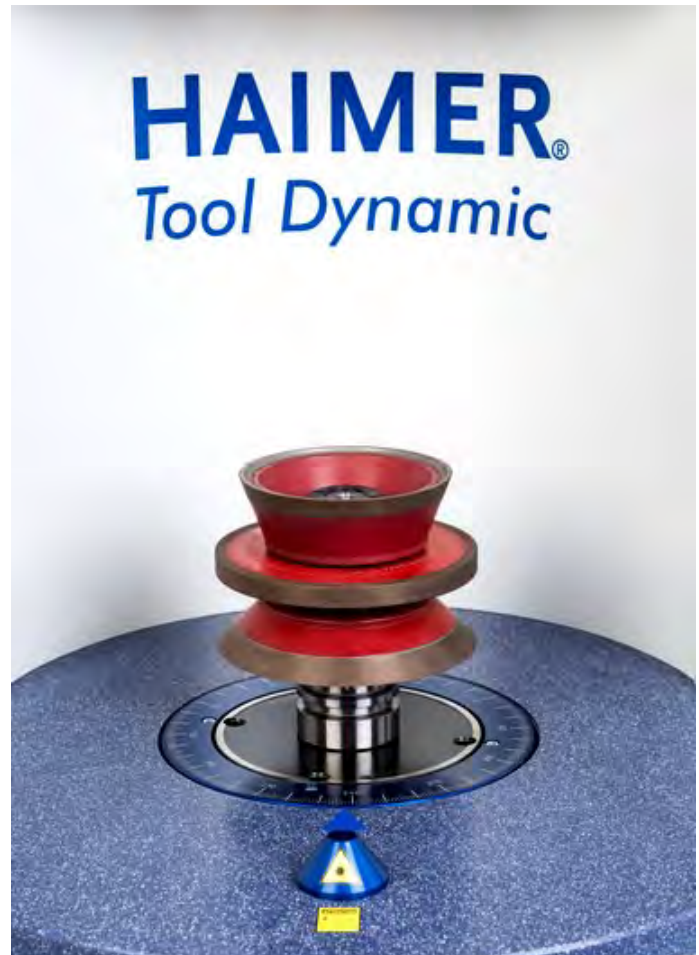
– Surface Finish: No physical measurements were necessary. A clear visible improvement in surface finish was evident.

“The results were undeniable,” said Vladimir. “Fast forward after all these year to today, and I cannot imagine grinding tools without balancing the wheels first. It has improved our machine utilization and improved the lifespan of the machines themselves.”

Conclusion

For OSG’s U.S. carbide production facility, the greatest value was in productivity and throughput. As a result, they increased grinding speeds for all machines utilizing balanced wheel packs by 18%, to bring the machines back to their original power consumption. Some operations, such as fluting, were able to be increased as much as 57%. While the dollar value of this productivity gain remains confidential, it was confirmed that ROI for the [HAIMER Tool Dynamic](#) balance machine was over 500% with a payback period of less than 3 months.

So whether it is tool life, surface finish, productivity or a little of all the above; balancing nets quantifiable returns.



Fast but Firm - Profile of Success: Koss Aerospace

As featured in Shop Metalworking Technology

Machining speeds: Up to 33,000 rpm on Handtmann, Makino machines

Toolholder: HAIMER Power Clamp Economic Plus NG shrink fit machine and Tool Dynamic balancing machine

High speed machining with speeds of up to 50,000 rpm isn't for everyone, but if your manufacturing requirements demand it, you need to invest in the right technologies to ensure success: a machine that can handle the speeds and tooling that won't break off during machining. Ensuring your tooling won't break off means you have to have the right toolholding system in place. Shop Metalworking Technology approached manufacturers involved in high speed machining and asked about their success strategies using toolholders in high speed machining applications.

Koss Aerospace has been in business since 1975, and from the beginning Drago Cajic, founder and president, has followed a philosophy of investing in the best technology to remain competitive.

In 2015, the company moved into the high-speed five-

axis machining arena, purchasing two Handtmann machining centers operating at speeds of up to 30,000 rpm. The machines produce aluminum aerospace parts, primarily structural parts like fuselage components.

"Since they were the first high speed machines, we needed different types of toolholders to handle the higher speeds," explains David Cajic, vice president of Koss Aerospace. "We had been using some hydraulic chucks for critical operations on our other machines in the past, but we switched to the HAIMER shrink fit toolholders after observing the success we had in high-speed machining with the HAIMER products."

Koss Aerospace selected HAIMER's [Power Clamp Economic NG shrink fit toolholder system](#) and HAIMER's [Tool Dynamic toolholder balancing machine](#). Now in operation for more than two years, Cajic and machinist Ljubisa Bodiroga, who works on the high-speed machines and uses the HAIMER toolholder systems, are impressed with the technology.

"I've never had any runout problem with this system. I like that it holds the tools and the toolholder very secure and we don't have any problems," explains Bodiroga.

The HAIMER shrink fit technology offers less than 0.00012" runout at three times diameter. Cajic says he also likes the versatility of the universal HAIMER shrink fit unit that is designed with a flexible and modular system. While the system is used primarily on high-speed machines, it's also used, from time to time, on other machine tools in the shop.

"Shrink fit eliminates vibration and chatter, so you get higher accuracies and because the technology holds tooling and toolholders so securely, it eliminates a lot of potential problems like tool breakage."

Other advantages that Cajic and Bodiroga like are the gripping force—the chucks can grip the cutting tool 360° around the shank on multiple



David Cajic, vice president of Koss Aerospace, says he likes the performance and versatility of HAIMER shrink fit technology.

***Fast but Firm - Profile of Success: Koss Aerospace
(continued)***

planes, providing very high gripping force, which in turn eliminates chatter during roughing and finishing operations—and setup consistency, which eliminates setup errors.

There are two other key attributes that contribute towards the HAIMER shrink fit toolholders' anti-vibration properties. The holders are balanced to G2.5 at 25,000 rpm, which in turn helps to reduce the imbalance of the full assembly and reduce vibration. And specifically with the Power series holders, the design helps dampen vibration because of a thick wall at the clamping bore and a wider body construction.

Cajic says the outlook for Koss is good. In fact, the company recently purchased a Makino five-axis horizontal milling machine, the MAG1, with machining speeds up to 33,000 rpm. Cajic says the company will use the existing HAIMER shrink fit system on tooling for the Makino for the short term, “but as we ramp up production with this new machine, we’ll be able to justify purchasing a second HAIMER shrink fit system.”

Koss employs 80 people and operates out of a 3,716 sq m (40,000 sq ft) manufacturing facility that houses a variety of CNC machines.

“We’re running three shifts so we’re able to handle the work, but space in our shop is at a premium and now that we’re investing in newer and, in some instances, larger machines, we need to make more efficient use of processes,” explains Cajic. “One way we’re doing that is replacing older machines with new ones as we get them. The newer machines usually take up less room and they can handle more work, so that’s making us more efficient.”



Ljubisa Bodirolga, who works on the high speed machines at Koss Aerospace, is impressed with HAIMER shrink fit toolholder technology.

Accurate Fishing Reels in the Business with Shrink Fit Products



To move forward, the company needed toolholders that offered extreme repeatability and the collet holders the company was using were not up to the task. Achieving perfect alignment with the center of their spindles was near impossible. Constant refinement was always needed to maintain adequate accuracy and machining lights out was a risky proposition. To further help maintain accuracy, time-consuming secondary processes of disassembling, soaking and cleaning the collets and nuts were also utilized. Despite all the time invested, scrap and part finishes were still an issue with their mechanical collet chucks.

Repeatability Issues Solved

David and Douglas soon spoke with HAIMER sales representative Jordan Tetzlaff about five years ago. “He was very patient,” said David. “He would drop by and help us with one thing and then another. About two years ago, he recommended the [shrink fit system](#) as a solution to achieve the kind of output we were looking for.”

David and Douglas Nilsen are identical twins and the 3rd generation to run Accurate Grinding & Mfg. Corporation, which was originally dedicated to making aerospace components. In 1990, the company entered the sportfishing tackle market. The new venture was called Accurate Fishing Products.

Making a Name in Sportfishing

The introduction of their patented TwinDrag™ system in 1997 really put the company on the sportfishing map. Traditional fishing reels apply drag to only one side of the spool, which is like trying to stop your car with brakes only on one side. TwinDrag™ allows for equal pressure on both sides of the reel, thus permitting more stable loads for smoother drags. Accurate has since expanded its high-tech reel series to include seven blue-water models and over 60 light-tackle models.

Finding a Way in the USA

All the company’s products are 100% American made. With runs of 300 parts per night, any runout errors would be disastrous. In addition to runout, the soft nature of the material placed a premium on surface finish quality.



*Accurate Fishing Reels in the Business with Shrink Fit Products
(continued)*

The switch made all the difference in the world. The [shrink fit system](#) brought the company the speed, tool life, finish and most notably, repeatability that allowed them run lights-out manufacturing with total confidence. No moving or wearable components in the holders meant their high degree of runout accuracy, balance accuracy and rigidity never deviated.

“Jordan coached us through the system and helped us along,” remarked Douglas. “At first the operators were just a little put off by the new technology. But once they realized they were done cleaning collets and nuts, and scrapping parts, they quickly jumped on board.”

With the shrink fit, production quickly increased ten-fold. “All our problems just went away,” added David. “With the HAIMER toolholders, we shrink the tools, place them in the spindle and walk away with no worries.”

Keeping the American Dream Alive

Like their grandfather and father, David and Douglas are machinists at heart. Their experience, combined with innovative designs and a switch to [HAIMER shrink fit products](#), helped the company experience a 70% growth rate for FY 2016. They are still growing at 35% year to date – without any increase in overhead. Their achievement as one of the few remaining U.S.-based manufacturers of sport fishing reels proves that with the proper focus on technology and productivity, American companies can not only compete, but excel, in the competitive global marketplace.



Shrink Fit Dramatically Reduces Costs for Birdwell Machine

As featured in CNC West

After experimenting with toolholders from around the world, Birdwell Machine found out early on that it doesn't pay to skimp on quality. They were using a high-end brand collet holder from Germany. While performance was good, the holders did not have very good clearance.

Birdwell Machine, based in Redmond, Washington, is a family-owned manufacturer that turns out everything from one-off prototypes to large scale production runs for the aerospace and scientific industry segments. Jon Birdwell, son of founder Mike, manages the company along with Assistant Manager Tyler Jacobson. The company prides itself on providing the highest quality craftsmanship and continually finding the best new technology that keeps them on the leading edge of their industry.

After experimenting with toolholders from around the world, the company found out early on that it doesn't pay to skimp on quality. They were using a high-end brand collet holder from Germany. While performance was good, the holders did not have very good clearance, which was extremely important when running side jobs on the company's 4 and 5 axis machines. They were also bulky and very expensive.

Six years ago, HAIMER Manufacturing Representative Michael Olejniczak introduced Birdwell's operating team to the [HAIMER 3D-Sensor](#). Impressed with its operation, Jon and Tyler decided to see if Michael could help them with their toolholder problems. He suggested the [HAIMER shrink fit system](#), so they ordered a few to test.

"The first thing we noticed when we opened the box was the precision ground surfaces on the toolholders," said Tyler. "That immediately showed us the attention to detail that HAIMER puts into every product."

As soon as they tried the toolholders on their 4-axis CNC machines, they saw how much additional clearance they gained. Besides the resolved clearance issues,



they were also impressed by Cool Jet, which provides high PSI while delivering coolant all the way to the edge of the cutting tool, significantly increasing tool life. When they added a 5-axis machine to their shop, the HAIMER shrink fit toolholders were immediately put to use on it as well, which allowed them to easily machine deep, hard-to-reach pockets.

Experimenting with the shrink fit holders, Jon and Tyler immediately realized the quality of the work turned out by HAIMER products outperformed the costlier holders they were using before. And since the holders were more economical, the company could buy three or four HAIMER toolholders for every one of the more

*Shrink Fit Dramatically Reduces Costs for Birdwell Machine
(continued)*



expensive brand. The HAIMER holders also had more variety to the lengths and styles available.

In just 18 months, the savings on toolholders paid for the shrink fit machine – not to mention the headaches saved for operators used to juggling many different brands and application specific holders. They also found that cutting tools were typically being loaded in holders, and actually used until no longer sharp, cutting down on wasted tooling. “We are able to leave commonly used tools loaded in holders, rather than unloading them and having drawers full of half used tooling.”

Today, the company uses short and long toolholders as well as heat shrink extensions which gives them better reach when using short tools. In fact, according to Tyler, “There isn’t an end mill holder challenge that we can’t resolve by using a HAIMER product.”

Implementing shrink fit also allowed the company to move the entire tool changing process into a controlled environment that supports tool management best practices. With the superior hold of the shrink fit, not only was the lifespan of the tool realized, but it was extended as well through enhanced balance properties, concentricity and the addition of Cool Jet.

“I admire the value-oriented approach of companies like Birdwell Machine,” commented Drew Strauchen, VP Marketing & Business Development for HAIMER. “A lot of shops approach toolholders as a consumable product, when they should be treated as a capital expenditure. The short-term strategy of buying cheap toolholders ultimately only fills up the scrap bin and leads to an increase of manufacturing costs.”

Tyler agrees. “Highly expensive models aren’t the answer either. It’s a much better long-term solution to invest in a high-quality system from HAIMER that quickly pays for itself. Short-term

savings on toolholders translate tenfold to costs when poorly balanced and ground tools damage the spindle taper and the bearings.”

Summing up their experience with the shrink fit system, Tyler said, “With HAIMER, Birdwell Machine has found a partner that reflects our own mission of seeking and using value-added products that represent the highest quality craftsmanship and leading edge technology.”

Shrink Fit Helps Moldmaker Boost CNC Accuracy, Productivity and Tool Life

As featured in Shop MoldMaking Technology

Fine tuning a CNC machine for maximum speed and having the ability to run lights-out machining means controlling a wide variety of elements like tool holding. The inherent benefit of shrink fit technology, as compared to other tool holding options, is that it virtually eliminates the toolholder as a variable for error.

When you pay millions of dollars for the CNC machines in your shop, don't you want to receive maximum payback from your investment? Equipment that sits idle costs money; as does equipment intended to run lights-out, that can't.

Custom Mold and Design, based in Minneapolis, Minnesota, knew accuracy was ultimately a problem hampering their productivity on eight machines that produce small medical components. Most of the jobs they run require cutting tools with diameters smaller than 2mm, working in hardened materials such as P20, S7, A2 and H13 tool steel.

With collet holders, maintaining runout accuracy was a major challenge. Part of the problem was the collet design that allowed dirt and chips to collect and remain in the holder, even after time-consuming cleaning procedures. Even minute particles of debris were enough to create uneven clamping pressure, which ultimately led to inconsistent runout accuracy. This inaccuracy had a direct impact on both productivity (slower machining speeds and rework) and tool life.

The goal was to bring out the full potential of their CNC machines by increasing: 1) accuracy, 2) finish, 3) productivity, 4) repeatability, and 5) tool life. Like many companies, Custom Mold and Design turned to HAIMER shrink fit technology to make it happen. Ten years ago, they purchased a [HAIMER Power Clamp Mini](#) with [BT40](#), [HSKA-32](#) and [HSKA-63](#) toolholders to address the aforementioned needs.

"We wanted to run lights out, and the collets we were using just didn't have the runout accuracy and balance properties we needed," said Gregg Virnig, the firm's Hard Milling Specialist. "We bought the HAIMER shrink fit equipment and never looked back."

Here are reasons why Custom Mold and Design gives



such positive feedback on the HAIMER shrink fit system:

Accuracy

"Even a slight error in runout makes a big impact on the smaller parts we make," Virnig commented. "With the shrink fit, we saw a notable reduction in benching." The amount of rework needed to bring out-of-tolerance parts back into specification decreased, thereby helping

Shrink Fit Helps Moldmaker Boost CNC Accuracy, Productivity and Tool Life
(continued)

Custom Mold’s throughput by getting the next job in queue on the machine faster.

Finish

HAIMER shrink fit technology is so accurate that Custom Mold and Design uses the toolholders for all operations, both roughing and finishing. The improvement in surface finish quality has reduced secondary polishing operation times by 30%.

Productivity

Higher and repeatable runout accuracy enabled Custom Mold and Design to increase cutting speeds by 10% across the board, resulting in a 10% reduction in cycle times. Furthermore, because extensive cleaning processes for collets and collet chucks were eliminated, tool changeover times were drastically reduced, and machine utilization increased. “With shrink fit, it’s easy,” Virnig mentioned, “you just put the tool in and you go.”

Repeatability

Custom Mold and Design appreciates the fact that

HAIMER toolholders have a consistent 0.0001” runout accuracy. No moving mechanical parts means no components to wear out and cause unpredictable accuracy problems. In fact, Custom Mold is still using the first HAIMER tools they bought ten years ago, with no sign of any degradation. They know this because the company etches the purchase date on each toolholder. This means that each holder has been through hundreds, if not thousands of shrink cycles, with performance the exact same as new. And it is this absolute repeatability that helps ensure they can run parts lights-out.

Tool Life

Custom Mold and Design nets significantly more tool life from their end mills in HAIMER shrink fit. This is because the same TIR accuracy that ensures geometric part accuracy also inherently improves the life of the cutting tool as well. Every degree of runout accuracy gained helps further prevent uneven edge wear, thus extending the life of their high performance carbide cutting tools.

Closing in On Perfection

Fine tuning a CNC machine for maximum speed and the capability for lights out machining means controlling a wide variety of elements. The inherent benefit of HAIMER shrink fit technology is that it virtually eliminates the toolholder as a variable for error. This repeatable quality allows operators to establish a solid baseline from which they can really begin to fine tune their machining processes and maximize efficiency.



Photo courtesy of Custom Mold & Design

Balancing Beyond G2.5 Nets Benefits

Most machinists know that balanced assemblies output better finishes, higher accuracy, improved tool life, reduced spindle wear and ultimately faster machining speeds. But for those guys really looking to optimize performance, the act of fine-balancing beyond standard balance specifications can net even more value, as one customer quickly discovered.

How a Higher Standard was Realized

Merrifield Machinery Solutions, a machine tool distributor in Pontiac, Michigan and master distributor of the German machine tool builder FOOKE, found out how just a minor degree of imbalance can make a big difference. Mike Martin, HAIMER's Regional Manager for Michigan, made a stop at their shop to visit Dan McLendon, the company's Applications Engineering Manager. Dan wanted to show Mike the machined finish of a very complex aluminum part that he wasn't quite happy with. Upon walking through the facility, Mike immediately noticed a low-pitched humming sound coming from the machine in question as it was performing a spindle warmup. As the revs increased to 15,000 rpm, the noise continued to grow louder.

Mike asked to see the cutter and holder in the spindle. It was a HAIMER HSK-A63 holder with a 20mm solid carbide cutter ball nose end mill from a high profile manufacturer. Mike took the toolholder assembly to the balancer in the HAIMER demo van. Upon inspection, the assembly was registering 2.81gmm of imbalance; just outside the permissible unbalance the ISO standard specification of G2.5 at 15,000 (permissible unbalance amount: 2.41gmm) allowed for. It was found that the imbalance in the assembly stemmed from the carbide end mill itself, which many end users often assume are balanced.

Since the HAIMER HSK-A63 holders come standard with threaded holes already in place for balancing screws, Mike was able to make a small correction to quickly fine balance the entire assembly. The result was a reduction of imbalance to only 0.87gmm. The entire assembly was now technically certified at G2.5 to run a maximum speed of 41,708 rpm, well beyond the maximum speed capability of this FOOKE vertical machining center.



After putting the assembly back into the machine and starting the spindle warmup cycle, John Boucher, another member of Merrifield's application team, noticed that it was quieter than before. In fact, it was so quiet, they weren't sure the spindle was even running. The reduction in spindle noise was a direct result of reduced vibration in the spindle, which had been adding an additional load to the bearings – creating the subsequent humming noise. Now running at 15,000 rpm and taking full advantage of the machine's capabilities, they didn't hear a sound.

After noting the sound improvement, the complex aluminum part was run again in the machine, and the result was a clearly visible improvement in surface finish.

"We didn't notice the noise that the assembly was making until after the tool was balanced and it was much quieter," said Dan. "But the lack of noise and a definite improvement in the surface finish after fine balancing the holder proved to us how important a

Balancing Beyond G2.5 Nets Benefits (continued)

balancing machine was.”

Dan was so impressed that Merrifield Machinery will now be including [HAIMER Tool Dynamic Balancers](#) as a standard option with certain high-speed 5-axis machines, knowing how much a difference it can make in these types of applications. “In the past, we didn’t know how to recognize imbalance and we believed that buying high quality tooling would be enough to ensure a balanced toolholder assembly. Thankfully we can now identify imbalance and have seen and heard the immediate benefits of fine balancing firsthand,” he said. “Since our end users might not know when a toolholder assembly is out of balance, we are going to take steps to ensure our customers have a way to inspect and correct it. In this way we are helping them maximize productivity while also safeguarding their investment.”

The Science of Balance

Dan is really doing his customers a service that so many do not, by giving them means to inspect (and correct when needed) that which they would otherwise be blind to. And while balance is important at any

speed, this application revealed that fine balancing beyond standard ISO specifications has significant benefits when higher speeds are involved. That’s why wise companies pay special attention to the Science of Balance. Like any discipline, the science of balancing toolholders has some basic guidelines to make note of before you start making chips:

1. A balanced toolholder is not enough – balance the entire assembly
2. All cutting tools are NOT perfectly balanced
3. The larger the tool the more likely it is to have imbalance
4. When two or more pieces are combined, the likelihood of an unbalanced condition increases (collets, sleeves, collet nuts, pull studs, tools, arbor bolts, etc.)
5. Balance at any speed is important
6. Fine balancing beyond G2.5 for higher speed applications will net more improvements

Out of balance toolholders take money out of your pocket. Balance affects productivity, speed, surface finish and tool life. Spindles fail sooner due to the increased load on their bearings, unacceptable finishes have to be reworked or polished by hand (which can take hours) and cutting tools wear out faster. All of these things are caused by imbalance. And it doesn’t take much. Even a small amount of imbalance can create big problems. Do you know if you are really balanced? Are you aware of how much imbalance is costing you?

Crunching the numbers will show that balancing units quickly pay for themselves in less than 12 months, in the form of cost-savings via decreased tool consumption, cycle time reductions and decreased maintenance costs. If you are not balanced, perhaps it is time to start. And if you are balanced, perhaps it is time to go beyond today’s standards to get even more from your tooling.



Aerospace Manufacturer Finds a Better Way to Balance

While the use of pre-balanced toolholders is highly recommended, it does not guarantee full machine tool utilization. For example, what effects do the cutting tools or face mill cutters have on the total balance of the assembly? And what happens when you change tools between jobs? Measuring the balance of the entire toolholder assembly is necessary to guarantee a consistent machining process. But without the right toolholder, balancing on the fly can be a time consuming and costly situation.

Accra Manufacturing, a division of PCC Aerostructures, is a world class machining, fabrication, and assembly supplier of precision machined parts and assemblies. Working strictly with aluminum, they began ramping up their production capabilities and running spindle speeds up to 20,000 rpm. They soon realized they needed the capability to balance toolholders on the fly to keep up with operations. Their old toolholders were balanceable, but to achieve the proper specifications, holders had to be hard balanced in a long series of steps: mark the tool, go to the drill press, drill the hole, go to the balancing machine again, check balance, re-drill if needed, etc. Eventually many holders were more hole than steel because the holders were unable to achieve repeatable balance after multiple tool changes, and had no other means for correction. To save time, some of the operators even began to change holders without re-balancing; this move ultimately affected productivity, reduced spindle speeds and tool life. Accra knew they needed to find a better solution to speed up the entire process.

Who to Turn To

Five years ago, HAIMER released the power series of holders as a standard stocked product. This gave our rep an opportunity to bring the HAIMER demo van to the customer's site to perform side-by-side demos to showcase HAIMER products. Although the Accra operations team supported and stood by their old holders, they soon began to see where HAIMER products were able to outperform the competition in durability, coolant delivery, anti-vibration, and more.

Their choice was confirmed when the company hired Mark Cox as Technology and Programming Manager to optimize and remodel their current technical and engineering processes. Mark previously worked for a



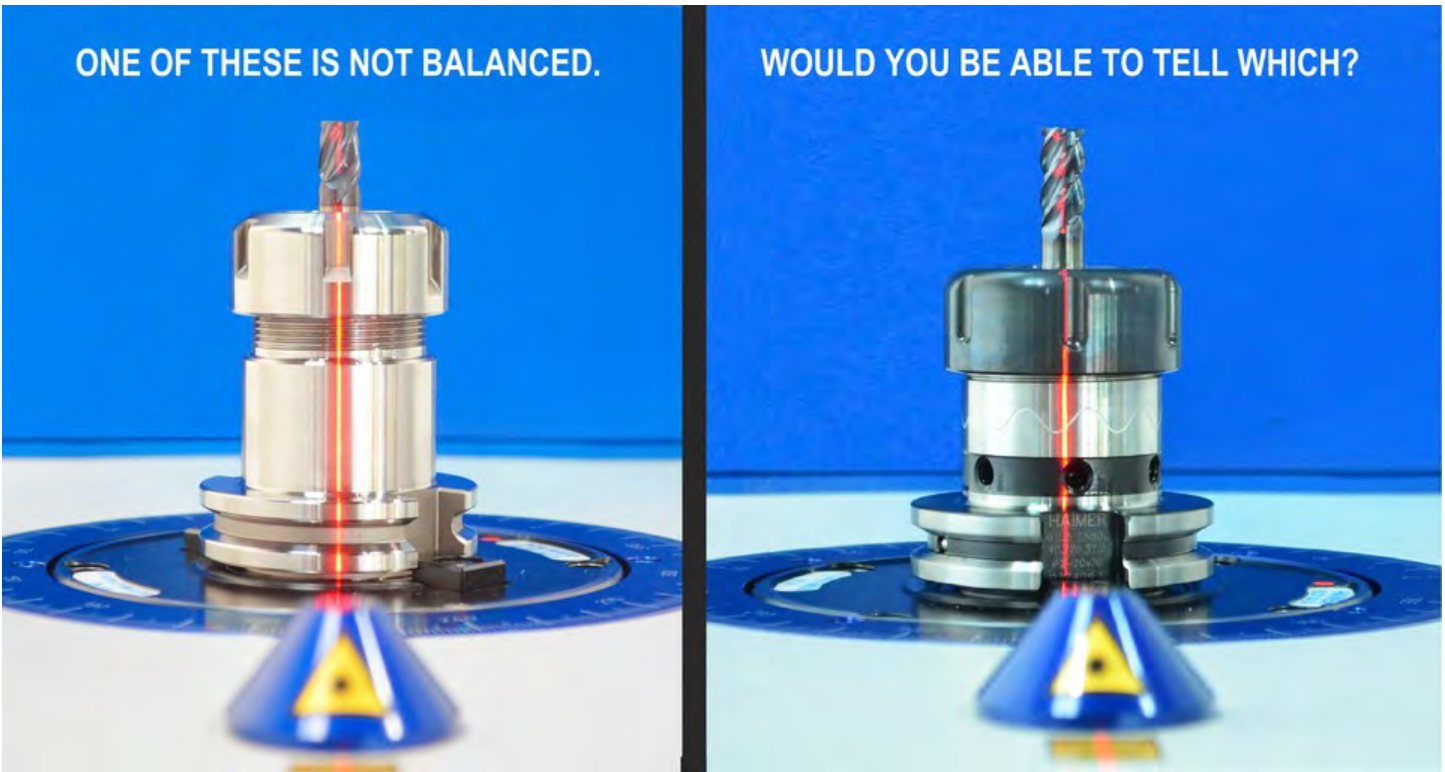
series of aerospace companies, all of which are HAIMER customers, so he was already familiar with HAIMER and understood what could be achieved by utilizing our products. In fact, one of the first things he did was bring in a [HAIMER balancing machine](#) to the main plant in Bothell, WA, allowing his team to balance the HAIMER holders directly on the machine itself, easily cutting the balancing time in half.

How HAIMER Helped

One of Mark's goals is to improve process and margins on many of Accra's staple work projects. The built in screw system of the HAIMER holders allowed for simple and fast balancing on the balancing machine he brought in; plus the standardized holders were more consistent from size to size. With enhanced concentricity (<0.00012"), built-in vibration dampening geometry on the holders, enhanced gripping torque and repeatability in balance and performance, the HAIMER products have helped him in this endeavor.

Accra Manufacturing now primarily uses HAIMER holders in their shop, and machine operators appreciate the new speed and ease of changing holders and assemblies. The additional tool life via the holders is also a noted benefit. With the toolholder situation under control, the company is now looking at other HAIMER products that will increase the efficiency and productivity of its operations and help Accra provide the highest quality components to its customers.

Efficient Preventative Maintenance



Any knowledgeable manufacturing manager will tell you that a balanced toolholder assembly unit is key to increasing productivity. It allows for higher speeds, increased cutting capacity and better surface finishes. But productivity aside, the impact of balance on preventative maintenance programs is equally important. Have you ever considered the cost of spindle replacements and the subsequent cost of machine downtime they create?

Control the Process or It Will Control You

The goal of preventive maintenance is to eliminate unexpected downtime. Unanticipated failures set in motion a series of time consuming events that can keep your cutting machines idle far too long. When spindles are replaced or stopped for repair the cost to the manufacturer are substantial. Costs include downtime, expediting, cost of additional labor and parts, overtime, extended deliveries, and unsatisfied customers.

Often, it's an unbalanced toolholder assembly that sets this chain in motion. Notice that we refer to balancing the toolholder assembly, not just the toolholder. That is because at HAIMER, we know that while a holder may be balanced out of the box, any component added or adjustment made to the holder can drastically impact balance.

Think of the impact balance has on your car's

performance. If just a single weight falls off your rims, the result is an unbalanced condition that generates vibration in the wheel while you drive. While less noticeable at lower speeds, the imbalance is still there leading to increased wear on your tires and drivetrain. So while the impact of an unbalanced toolholder assembly is not always apparent during machining, it is still there and costing you money.

Case Study #1: Blow Out Bonanza

A customer called one of our distributors – Geonics (Creative Evolution CNC) – saying they had blown out a spindle. Fortunately Sales Representative Ken Nicoloff had spares in stock and was able to replace the spindle the next day. But soon after the phone rang again – the first spare had just blown out as well!

Ken went to the client's shop immediately and picked up three toolholders along with the cutters in use when the

*Efficient Preventative Maintenance
(continued)*



replacements and schedules the down time for changing them out. The result is a controlled maintenance program planned around flow time, vacations and summer shut downs. Planned downtime during such times creates considerable cost-savings, but is only possible when spindle failure is predictable.

Don't Blame the Balance

While there are other causes for machine spindle repair, most premature spindle failures are caused by an unbalanced toolholder assembly. One additional benefit to balanced assemblies, outside of longer spindle life, is the elimination of a major variable when troubleshooting is required. This saves engineers and preventative maintenance manager's time!

Putting the "Prevent" in Preventive Maintenance

Using balanced toolholder assemblies is a great way to get a head start on preventive maintenance. If you are not currently using balancing technology, there are four things you can do:

1. Continue without balancing and hope everything holds together (not recommended).
2. Have your toolholder assemblies balanced by an outside vendor (good).
3. If you don't have a balancer, use the best toolholder possible. HAIMER shrink fit holders have perfect repeatable balance properties, each certified to G2.5 at 25,000 rpm. (better).

Invest in a balancing machine for in-house use. They are as fundamentally important as other equipment you likely already have in-house, such as tool presetters. With a unit onsite, nothing stands in the way of maximum productivity and minimum maintenance (best).

The customer in Case Study #1 chose option # 3 and has had no catastrophic spindle failures since. Talk to HAIMER about [what an onsite toolholder balancing system can do](#) for your productivity.

failures occurred. They were ER style collet holders. While it was determined that two of them were okay, the third holder was another story. It was dangerously out of balance. All toolholders in the U.S. should be balanced to G2.5, per ISO 1940-1 balance standard. To be within this tolerance, the holder in question should not have been run over 6,300 rpm. The customer was running it at 19,000. That's what took out two spindles in the space of a few hours!

Case Study #2: A Balanced Approach

Another customer, a large aerospace company, has a preventive maintenance manager who believes firmly in balancing tool assemblies. He thinks that a "predictive" program is an incredibly important part of the maintenance equation. His department confirms each assembly is balanced "as they will actually run" before they go to the floor. The spindle manufacturers he works with give him a life span for their spindles – let's say seven years. At six and a half years, he orders the

Toolholder System Empowers Workers, Boosts Productivity

As featured in Manufacturing Engineering



Dan Olson, Plant Manager of Manufacturing, Skills Inc

How do you boost productivity in a highly competitive industry segment while improving the quality of life for your workforce? That's the story of Skills Inc. (Auburn, WA), a company that is so unique it has two bottom lines—one financial and one social.

Skills Inc. is exceptional within the manufacturing world in that it is a 501(c)(3) nonprofit company that is 100% self-funded through its four lines of business— aerospace manufacturing, aerospace finishing, technical services and business solutions. Despite the intense competition in its industry segment, the company successfully operates in an open market and receives no government subsidies.

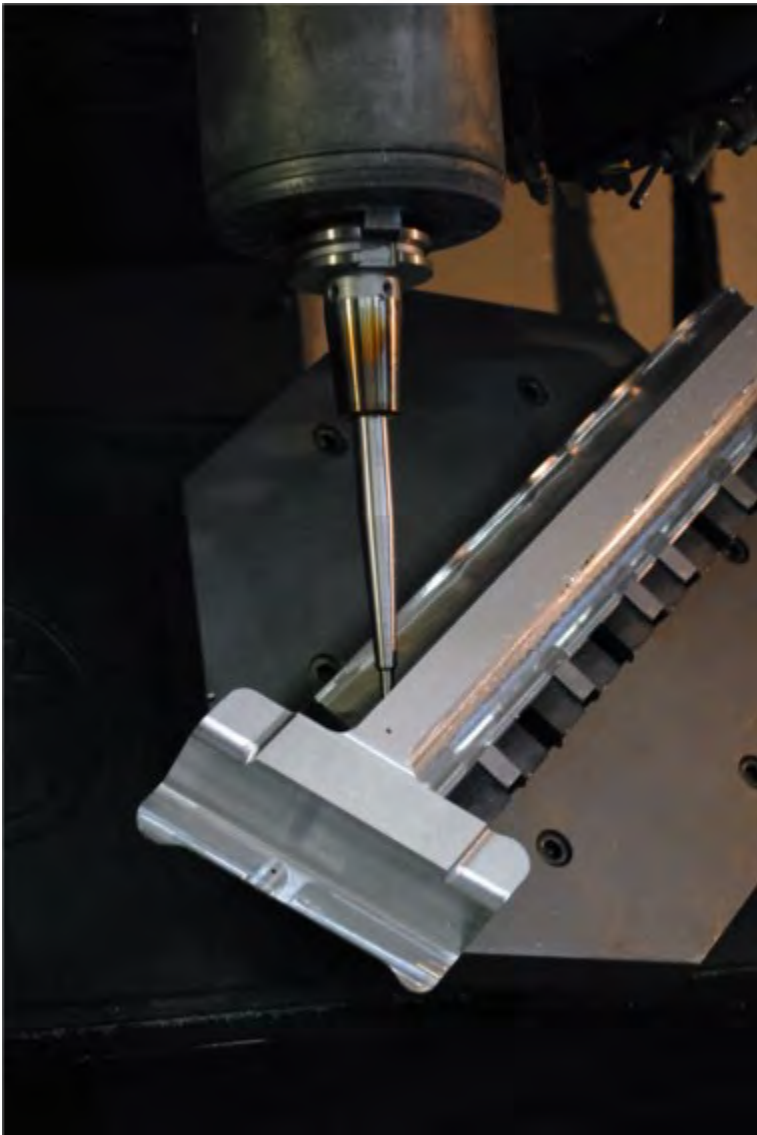
Although nearly 60% of its 700 employees have a self-identified disability, Skills Inc. employs and serves a very diverse population of adults and youths across the organization. It provides essential industry, technical

and workplace readiness training that is greatly needed but sorely lacking in today's marketplace. The company has been in business since 1966 and operates three plants in Auburn and Seattle.

When Dan Olson joined Skills Inc. as plant manager of manufacturing in 2012, the company was using a hodge-podge of extended length tools held by milling chucks, collet chucks, and side-lock toolholders. The skilled operators were turning out a quality product, but it was slow, took a lot of effort and produced a lot of chatter and scrapped pieces. Dan knew the only way to get rid of the chatter and pick up some speed was to make a change in toolholders.

One of the reasons Skills Inc. is so successful is its willingness to invest in new technology. In fact, due to its nonprofit status, most of its earnings must be reinvested in the company. So when an opportunity to

*Toolholder System Empowers Workers, Boosts Productivity
(continued)*



HAIMER shrink-fit systems use thermal energy to expand holders to clamp the tool in the chuck for enhanced balance and runout accuracy.

improve productivity comes along through the use of a superior product, implementation is rapid.

Within two weeks of arriving, Dan had removed the old toolholding systems from 24 machines (a mixture of vertical machining centers and toolroom mills) and standardized the entire manufacturing plant with [HAIMER's shrink-fit toolholders](#) and [Power Clamp Economic Plus](#) shrink-fit machines.

Having used HAIMER shrink-fit toolholding systems for years in a former position, Dan knew firsthand that they

were easy to use, allowed for fast tool changes and had excellent balancing capabilities.

After a demonstration in the HAIMER product van and the installation of a sample on-site, the operators were more than happy to abandon the collection of side-locks and collets they had been using and switch over to shrink-fit.

The operators soon found out for themselves that the HAIMER shrink-fit system was easy to use and had great repeatability. It is the only high-torque toolholder system that is so simple that tools can be changed with one hand. Other mechanical formats take two hands and lots of muscle to tighten the clamping mechanism.

Unlike mechanical holders, the shrink-fit system uses heating and cooling cycles that clamp the tool in the holder with incredible rigidity. Since the shrink-fit system is thermal, there is a huge reduction in complexity and the resulting need for muscle and dexterity to achieve a tight fit.

According to Dan, "An operator previously using a side-lock holder had to first grind the Weldon flat on the tool, and then assemble both through a process of touch and feel. Now operators are able to quickly learn the HAIMER shrink-fit system and replace the tool exactly the same every time, in just seconds."

HAIMER states that the shrink-fit holders have a precision bore which results in less than 0.00012" (0.003-mm) runout. Since there are no set screws, collets or nuts, balance is highly repeatable, resulting in increased tool life and surface finish. It has the highest gripping torque of any holder and will shrink both carbide and HSS cutting tools with changes of less than five seconds on average. The tapered design provides the ultimate in rigidity and since there are no moving parts, the toolholder clamps the same way each time.

At Skills Inc. the transformation to the shrink-fit system was fast since the HAIMER product was significantly easier to learn and put into operation than previous toolholding systems. Setscrews, torque wrenches for

***Toolholder System Empowers Workers, Boosts Productivity
(continued)***

collet chucks, grinding for setscrews and whistle notches and the time-consuming training were all eliminated overnight. Without the complexity and number of steps to be implemented, more employees were able to move into the operator position with great success, which helps to satisfy the social bottom line. This was just the beginning of the benefits Skills Inc. enjoyed with the HAIMER products.

On the financial side, a reduction in tool overhang produced a 30% increase in metal removal rate (MRR). Cutting tools that once had to be replaced after machining one part now lasted for four—4× increase in tool life. More than 1½ hours of benching and manual reworking per part were saved due to the elimination of tool-related chatter. This step alone created approximately \$2700 in savings for every 20 parts. Additional savings in time and material was achieved when the scrap rate dropped from 7% to less than 3%.

Not only did the increased reach capabilities remove the chatter, jobs previously done on a four-axis CNC machine were able to be moved to a five-axis, reducing the cycle time from 15 to 2.5 hours and from eight operations to two. The resulting time savings allowed Skills Inc. to eliminate excessive machining and handling at a tremendous cost savings (roughly \$38,000 annually on this specific job) and reduce the daily wear on all 24 pieces of equipment.

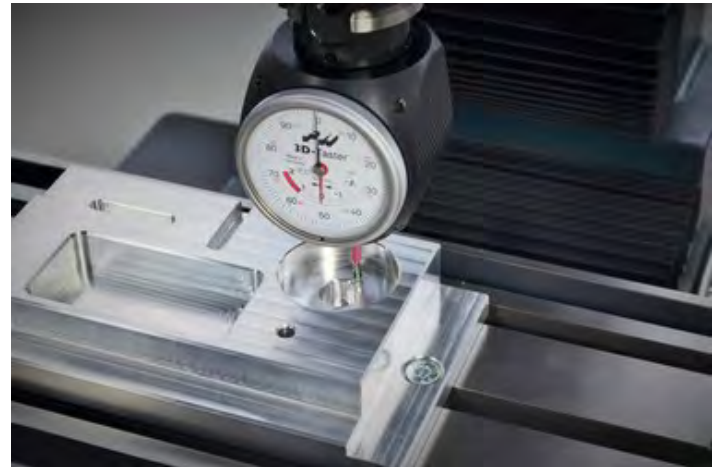
Despite competing on the open market with no government subsidies, the company has enjoyed double-digit growth for each of the last four years. According to Dan, some of the credit goes to the addition of HAIMER products, plus having quality, skilled and adaptable machine operators, who Dan said he would put up against any other shop out there.



Skills Inc. saw a 30% increase in metal removal rate (MRR) and a decrease in the scrap rate from 7% to less than 3%

HAIMER Hits the Bullseye for BH Tool

BH Tool of Salt Lake City, UT uses many tools in its quest to achieve the highest possible quality and precision. But sometimes the most effective arrow in the quiver isn't the most expensive, according to owner Bryan Haslam, who has discovered the perfect balance of high- and medium-tech for his tool-making operation.



One of the devices BH Tool uses to attain its high degree of accuracy is the [HAIMER Zero Master 3D Sensor](#). It enables a machine tool operator to accurately and easily measure and identify X, Y and Z workpiece dimensions. The workpiece can be approached from any of the three directions. Once the gage reaches "0", the machine is resting directly over the edge of the workpiece. No calculations are needed.

"Technologically, it's kind of the middle ground," says Haslam. "There are very high-end pick-up probes that are integrated with the controller. Then there's something more straightforward like the HAIMER sensor for a normal CAT 40 shank."

With the Zero Master, Haslam says he reduces costs, increases productivity on the shop floor and offers relief to his operators through its ease of use and improvement on more traditional edge finding methods. "Less expensive edge finders are slower and often knock themselves off center once they find the edge," Haslam says. "They can also leave marks on the softer materials like aluminum.

"The Zero Master isn't better than an automatic, higher-end, integrated probing device," Haslam continues, "but as a tool maker where everything changes constantly and nothing is really a repeat job, the cost and straightforwardness of the HAIMER unit fits the situation. In every respect, the HAIMER 3D Sensor does the same job (as the more expensive probing systems) without all of the electronic trickery."

The bottom line, according to Haslam, is the result. "I'm getting 50 percent better accuracy and 50 percent more speed using the Zero Master than I would be without a tool like this."

The Zero Master has another advantage, says Haslam.

"One thing that makes it unique from the most fundamental edge-finding devices is the ability to measure in the Z axis for setting depth as well as the X and Y," he says. "Typically the other methods for edge finding do not deal with the Z axis. The HAIMER 3D Sensor does."

The use of HAIMER's Zero Master 3D Sensor is just one aspect of BH Tool's commitment to quality and precision. "We select only top-quality machine tools and all associated tooling, inspection and measuring methods," Haslam says. "Materials are purchased from only the best suppliers and heat-treating for hardened tooling is given the utmost attention, for quality results and longevity. Attention to every small detail is the BH Tool standard."

At HAIMER, we are pleased that after such careful scrutiny, our products are held in such high regard and have earned their place on BH Tool's shop floor.

Shrink Fit Gives SURKUT a Competitive Advantage

SURKUT Machine Technology Inc., a Canadian company servicing the tool and mold industry, prides itself on having the right equipment on hand for high-speed, high-precision machining. When it comes to tool holders, that means the HAIMER Power Clamp Comfort shrink fit machine and shrink fit holders for their HSK-63A and CAT-50 spindles.

SURKUT has been a loyal HAIMER customer since their inception in 2005. The owner, a high-speed machining expert, used HAIMER products before starting his own company, and he knew what worked best from personal experience.

“The selection of the right tool holder is one of many factors that contribute to cost savings in extended tool life, reduced scrap, and more,” stated Keegan Noxell, VP of Business Operations at SURKUT. “At SURKUT, we are firm believers that no shortcuts can be made when selecting the machine tool, tool holder, cutting tool and CAD/CAM software. They all play an equal role in the success of hard milling and high-speed machining.”

“There is little to no alternative to the rigidity, low runout and fine balance offered by HAIMER tool holders when machining to negative stock,” stated Noxell. SURKUT also appreciates the flexibility of the HAIMER tool holders when cutting deep cavities in plastic injection molds or large aluminum diecast components. The use of shrink-fit extensions in addition to the shrink tool holders allow them to machine in areas not easily reached with a holder and collet extension combination.

SURKUT operators like the HAIMER shrink fit technology for its repeatability, ease of use and the ability to rapidly



change tools as opposed to using wrenches to undo collet assemblies. New operators quickly see the advantages and adapt to the new technology with enthusiasm.

According to Noxell, the [HAIMER Power Clamp Comfort](#) is an innovative machine that holds its value and keeps SURKUT on the cutting edge of technology in the tool and mold industry. Along with the time saved, the management team also appreciates the induction shrink technology. It provides longer use of the holder, which benefits the company’s bottom line.

In summarizing the HAIMER/SURKUT relationship, Noxell said, “HAIMER is a first class supplier of tool holders, balancing, shrink-fit machines and much more for the manufacturing industry backed by a great group of individuals, most notably Brendt Holden, President of HAIMER USA.”

“As a value-added service to our customers and fellow industry peers, we recommend products that best suit the application at hand, whether it be machine tools, tooling or tool holders and shrink-fit technology from HAIMER. We don’t hesitate to guide them towards products that will improve their process, surface finish and capabilities. They realize the value, quality of products and ease of use instantly.”



Napoleon Machine “Destroys” Cycle Times

Our chat with Kevin Febrey, president at Napoleon Machine, on the influence HAIMER equipment has had on his shop to “destroy” their cycle times and to get the most quality out of his older equipment.

Ben Bernanke, former head of the Federal Reserve, said the 2008 financial crisis was the worst in global history, worse even than the Great Depression. The manufacturing industry was hit particularly hard.

However, when Kevin Febrey saw the unique opportunity to lease an entire machine shop in Napoleon, OH that had closed its doors, he jumped at the chance. “My business partner Paul founded Napoleon Machine in 2010, and when I saw these machines still in the shop, just sitting there and doing nothing, I saw that as a cool way for us to get started,” he said.

Febrey, machining since 16 and with a masters degree in business, saw things from the dual perspective of shop and operations. Upon joining Napoleon Machine in 2011, he focused on getting the most quality out of his older equipment. This bought him time until the company was ready to make a high-end equipment investment for increased precision.

When he was ready for that new equipment, he turned to HAIMER.

HAIMER: Tell us a bit about your company and the industries you serve.

Kevin Febrey: We fabricate components and assemble them, focusing on medium-to-large components (anywhere from 200 pounds to 60,000 pounds). We are capable of machining components 16 feet by 40 feet long. We manufacture for OEM machine tool builders with a focus in the automotive, agriculture and mining industries. We are now breaking into aerospace as well.

HAIMER: Which products of ours are in your shop?

Kevin Febrey: The [HAIMER Power Clamp Comfort New Generation \(NG\)](#) shrink fit machine, HAIMER complete [tool room hardware management system](#), and a full



spectrum of HAIMER shrink fit holders and shrink fit extensions. We didn’t look anywhere else but HAIMER. Having sold HAIMER products back in my selling days, I had a solid working knowledge of the benefits and capabilities of any of their products, so I knew HAIMER would be the right fit for us. Other sales guys tried to break in, but I told them “sorry.”

HAIMER: How was the training and support?

Kevin Febrey: There’s been really good follow-up throughout. There weren’t any hiccups and all the dates were hit when they were supposed to be hit. When it was time for training, HAIMER came on-site and did the training. There haven’t been any issues whatsoever.

HAIMER: What benefits have you seen?

Kevin Febrey: The HAIMER system grows as you grow. You can start with the system, then as you grow and evolve your investment is still minimal. You can go from entry level to high end without changing a whole lot.

The HAIMER toolholder allows the cutting tool to run with virtually zero runout all the time. Flutes run zero. Then you gain speed in the manufacturing process. You get consistent repeatability, which reduces variables and ensures we spend less time chasing problems.

Napoleon Machine "Destroys" Cycle Times (continued)

HAIMER: Thanks for your time, Kevin!

Kevin Febrey: You bet. A mistake I see people make a lot is when looking at the price of a cutting tool, they say, "We can't afford that." In reality, they're not doing a total cost analysis.

When you make a choice to sacrifice quality, you're already paying for it in inefficiency. In today's competitive industry, you have to have fast lead times and machine as fast as you can while still maintaining a quality product, otherwise you won't get the work. It's all about high performance. I've proven again and again that high performance is actually the total lowest cost.

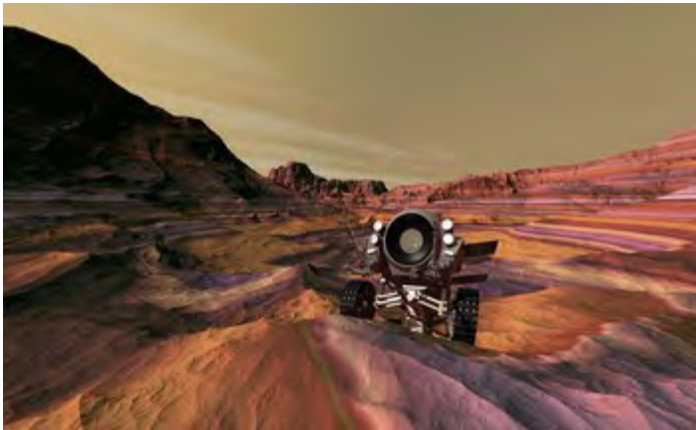
Machining is a process. You need to have a good machine, tool holder, cutting tool, software, fixtures, and operator. Those are all links in the chain. If any links are weak, the process fails.

That's why I recommend HAIMER and I have throughout the years. We have destroyed some cycle times by integrating HAIMER with these new machines. Quality is built into the process.



Helping Next Intent Build for Space Travel

The moment you call Next Intent or land on their website, you're greeted with their tagline: "We Build Really Cool Stuff!" Considering they manufacture for aerospace and space travel — even building all the wheels on the 2003 Mars Exploration Rovers — we are inclined to agree. What they manufacture is so exact that few others will even attempt the work.



HAIMER is proud to play a supporting role in helping Next Intent build really cool stuff with the utmost precision. We sat down with Rodney Babcock, President and CEO of Next Intent, to discuss his go-to HAIMER products and what his team thinks of them.

HAIMER: What type of products does Next Intent manufacture?

Rodney Babcock: We build aerospace components and work with a range of clients, including the NASA jet propulsion lab. We built the Mars Rover wheels in 2003 and have been on other NASA projects since.

HAIMER: Which of our products do you use?

Rodney Babcock: When we brought in our 5-axis machine, we knew it was a good time to bring in the [HAIMER Shrink Fit](#). The quality of the toolholders is just exceptional. The concentricity of the tool is extraordinarily accurate, and it allows us to make more difficult parts. It's been fantastic.

HAIMER: Is the difference noticeable?

Rodney Babcock: We always buy high quality holders, yet we can still see the Shrink Fit difference. In all, we have a couple dozen different size Shrink Fit holders,

and in comparing them with standard holders, there is an immediate jump in the quality of surface finish by eliminating runout.

Shrink Fit helps us push the envelope of what even our programming system will do. We're pushing boundaries of what's possible, holding less than half a thousandth of an inch, so it's important that we don't compromise surface finish and concentricity for our complex parts.

This makes it easier on my team. My job at the moment is eliminating variables for the machinist. Having extended reach and concentricity and balance all in one holder makes their jobs easier. The Shrink Fit reduces or eliminates those three variables with one holder.

HAIMER: How has the support been?

Rodney Babcock: The west coast reps were great, and the full training they gave our guys was excellent. There wasn't a ton of follow-up because the training was right on target.

We haven't needed any after-sales service, which speaks to the quality of the Shrink Fit machine itself.

HAIMER: What did your team think of it?

When I first presented the Shrink Fit solution to my guys, they weren't necessarily against it, but they didn't think it'd make much of a difference. But whatever reservations they had were eliminated quickly when they saw it firsthand. When my shop guys first use HAIMER, they always say "Oh wow. That's really cool." It wins them over instantly.

HAIMER: Rodney, thank you for your time and your kind words!

Rodney Babcock: My pleasure. I'm a big fan of HAIMER. I love the motto "Quality Wins." You say that and then you back it up. The Shrink Fit has been a great product.

Safe-Lock™ Ensures a Competitive Advantage in Heavy Duty Machining

Glätzer, a CNC-machining specialist, was up against extremely high engagement and cutting forces on a part that caused tool pullout. The cutting tool created a bottle neck, which forced machining rates below profitable levels. After a year testing all available solutions with no luck, they finally read about HAIMER's Safe-Lock™ system.



The Challenge

The Glätzer Company, a CNC machining specialist dealing specifically in the highly competitive automotive industry, was having problems with a large order of parts for truck disk-brakes. Milling concave contours created extremely high engagement and cutting forces that were causing the tool to pull out from the holder. Production was running at full capacity, but machining rates were far too slow to be profitable. The cutting tool Glätzer was using represented the bottleneck in the operation. All available solutions were tested for half a year and a lot of money was spent. Then, the Glätzer operations manager read about HAIMER's Safe-Lock™ system in a technical magazine.

The Solution

With the [Safe-Lock™ system](#), special drive keys in the chuck and grooves in the tool shank prevent the milling cutter from spinning and pulling out during heavy duty machining. In addition to the frictional clamping forces of the particular clamping system, the tool is held using positive locking in the tool holder through the constructive design of the Safe-Lock™ System.

The combination of pullout protection and best runout accuracy leads to low vibration and balance repeatability, thus increasing machining efficiency. Due to the increased cutting depths and feed rates, the metal removal rate can be increased by up to 100%, and to a similar degree tool wear decreases due to the excellent runout and balance characteristics.

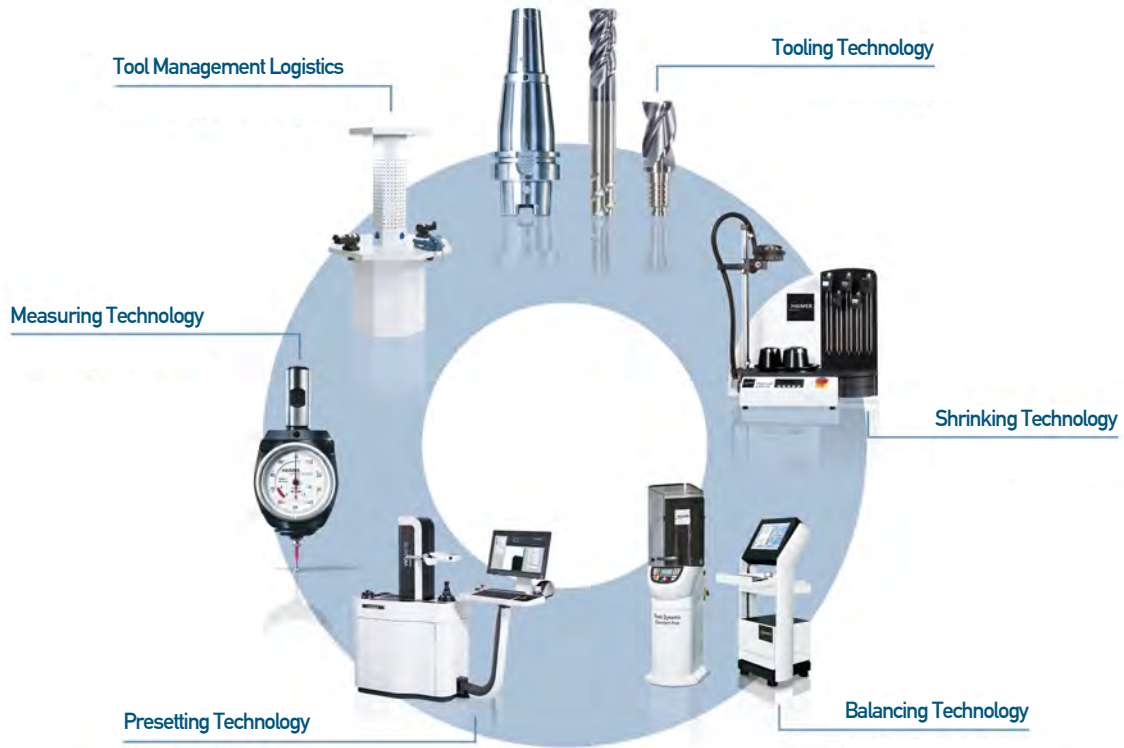
According to Glätzer's operations manager, "HAIMER was able to develop a system which combined the excellent runout of their shrink fit chucks with pullout protection, thereby guaranteeing process reliability."



Even experienced employees at Glätzer couldn't believe how many new possibilities emerged by using this system. Cutting data improved significantly.

THE RESULT

Thanks to the positive and frictional clamping system, the Glätzer Company was able to reach a new level of productivity. The incorporation of Safe-Lock™ with shrink fit technology meant the customer also benefited from the extremely high runout accuracy and balance characteristics these chucks offer. Lastly, the metal removal rates were vastly improved via improved chip evacuation provided by the Cool Flash coolant delivery system. The combination of accuracy and efficiency yielded higher productivity and a 40% increase in tool life.



Haimer USA, LLC | 134 E. Hill Street | Villa Park, IL 60181 | USA

Phone 1-866-837-3265 | Fax (630) 833-1507 | haimer@haimer-usa.com | www.haimer-usa.com

Haimer Mexico | Anillo Vial Fray Junipero Serra No. 16950 Bodega 2 | MicroParque Industrial Sotavento

Querétaro., QRO. C.P 76127 | Mexico | Phone +422-243-0950 | haimer@haimermx.com | www.haimer-mexico.com