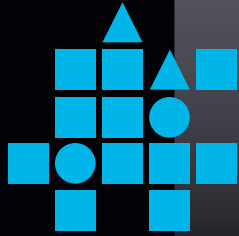


# experience

**AGIE**

PARTNER TO THE BEST



NO. 28

## Frontiers in Manufacturing

### editorial

The Vital Importance of Value Realization

### partner

AllTech Precision – Valencia, CA

Anderson Global – Muskegon Heights, MI

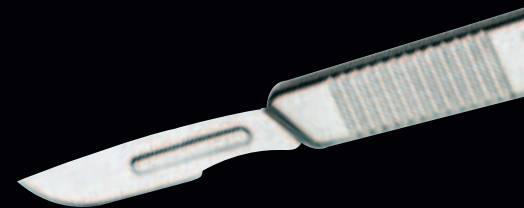
Die Technology – Osseo, MN

Engineering Techniques – San José, CA

Kenmode – Algonquin, IL

Pennco Tool & Die – Meadville, PA

Ron Witherspoon – Campbell, CA



# The vital importance of value realization

experience **AGIE**



Special  
North America

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**Editor:**

M. Katz

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R. Grizzi, M. Milani

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AGIE LTD  
575 Bond Street  
Lincolnshire  
Illinois 60069  
Tel +1 847 478 3500  
Fax +1 847 478 5780  
www.agieus.com  
info@agieus.ch

In *The Prime Solution*, author Jeff Thull describes a «value gap» and cites three reasons for customers failing to realize the potential value of their investments:

1. The product or service is unable to deliver on the promises made.
2. The customer is unable to properly implement the product or service.
3. The customer's expectations are not met.

For us at Agie US, this provides a most interesting challenge—and opportunity. In short, the value gap is the difference between what the customer expects and what the customer gets—or perceives he has gotten.

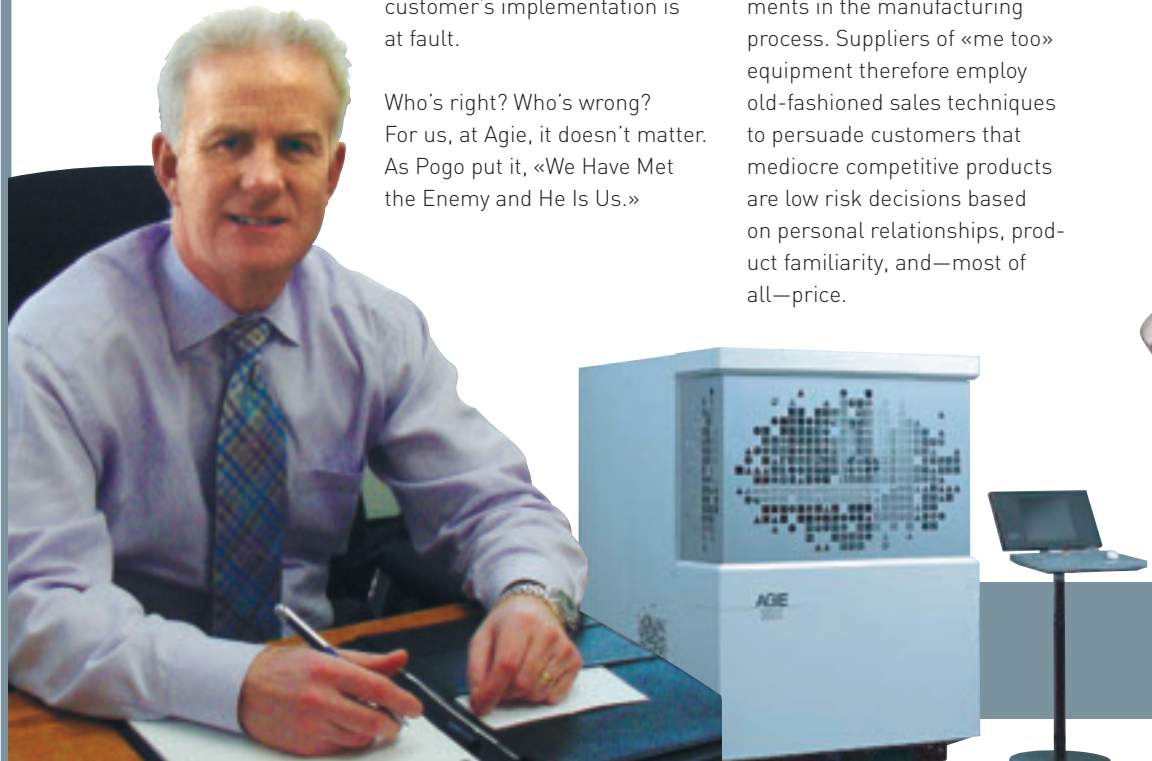
For example, installation of the customer's new EDM goes without a hitch and the machine performs generally as promised, yet the customer still does not receive the value he expected. Perhaps the salesperson led the customer to expect a 30 percent increase in productivity, but he only realizes a 20 percent gain. The customer may rightly consider this a failure, since his return was less than that promised.

Typically, this sort of situation sets off a round of finger pointing. The customer points out that the solution didn't work as promised. The supplier may be tempted to respond by saying that the solution works and the customer's implementation is at fault.

Who's right? Who's wrong?

For us, at Agie, it doesn't matter. As Pogo put it, «We Have Met the Enemy and He Is Us.»

Or to put it another way—in a market where long-term relationships measured by repeat business are critical to continued success, we recognize that there is no room for disappointment, much less failure. The goal must be to develop mutually profitable partnerships throughout the lifetime of every machine we sell. Now here is the paradox. At one end of the product spectrum, if an EDM meets basic requirements for accuracy and surface quality, and uses a standard machine tool control that is familiar to everyone in the shop, there is little complexity, little perceived risk, and little likelihood of a value gap. But at the same time there is little opportunity to make significant improvements in the manufacturing process. Suppliers of «me too» equipment therefore employ old-fashioned sales techniques to persuade customers that mediocre competitive products are low risk decisions based on personal relationships, product familiarity, and—most of all—price.





# AGIE V SERIES

## Agie V Series defines new Frontiers in Manufacturing.

### In today's competitive global market there is absolutely no future in mediocrity!

So at Agie we are taking a different approach. We are calling on everyone in our organization, from R&D to the factory floor, from our sales and marketing staff to our customer support team, to focus on identifying new value creation opportunities as sources of business advantage for our customers. The article on page 20 featuring Kenmode Tool & Engineering is a good example of the shift from «It's installed and running,» to «We will ensure that you are getting the value we promised.» Prior to taking delivery on a new Agiecut Progress 3, Kenmode partnered with us in an evaluation of their entire EDM operation. Goals and benchmarks were established and a four-phase program implemented. The end result was not only successful integration of their new Agie EDM, but optimization of their entire department.

Becoming this kind of business resource to our customers is a firm Agie commitment. We view it as nothing less than the most important opportunity for us to differentiate our company and products in order to provide our customers with a durable competitive advantage. That's why we have begun implementation of new initiatives that will help transform Agie—unlike its competitors whose focus is on selling a variation on a current theme—to a lifelong partner where we are relied upon as a source of business advantage for our customers.

In «Death of a Salesman,» Willy Loman was described as going out on his route on «a smile and a shoeshine.» Today, this simply will not do. The requirement is for technically competent business partners who can deliver fully integrated, comprehensive solutions that result in lasting competitive advantage.

**That is the Agie  
«100% Service»  
promise.**

Based on the proven performance of its Agiecut® Vertex, Agie has extended «V» technology to its entire wire-cut EDM offering. All models will now share the proven IPG-V Vertex generator as well as the Windows XP-based Agievision 5 control.

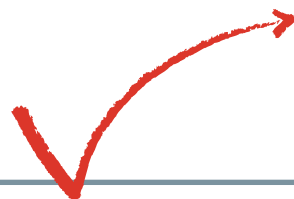
As Executive VP Glynn Fletcher puts it, «This is improved performance that is significant and measurable. In five years on the market, the Vertex has earned the reputation of being the most accurate wire machine in the world. Now we are bringing that level of performance to every Agie wire-cut system we sell.» The list of user benefits featured on V Series machines include:

- Top notch 3D graphics with real time views and adjustments
- Activity bars for direct selection of tasks
- Dual Pentium M chip, 40GB hard drive and 512 RAM

- Dynamic response to virtually any situation with Contact Manager, Lotto, Pieceinsert, Variocut, and Automatic Wire Offset

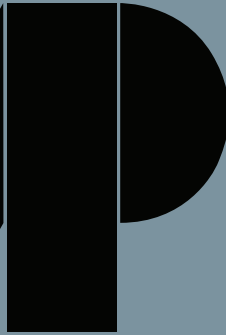
The new technology applies to the company's Classic and Progress series and the new Vertex 2 and 3. Both the Progress and Vertex also feature eCut generator technology that achieves surface finishes as good as 0.8 µm Ra with one precision cut—a process that is completed in half the time required by technologies that incorporate a main cut and trim cut. In addition, the faster precision cut requires 40% less filter and resin and results in 60% less wire consumption.

For more information on the new Agiecut V Series and the complete line of Agie wire and die sinking EDM systems, click on «Our Products» at [www.agieus.com](http://www.agieus.com)



# AGIE

first in machining solutions



With the company's focus on innovation, AllTech Precision overcomes engineering and manufacturing challenges that would defy many other EDM shops. Many of their customers' applications are unique and involve machining exotic materials such as titanium, pure tungsten, Haynes alloy 188, and Invar. Working with these materials often requires an «inside out approach,» company spokesman Danny Minikus notes. «This is a puzzle the competition should learn to solve!»

The flexure mount shown below is a key component in the Jet Propulsion Laboratory's SIM (Space Interferometry Mission) that will survey deep space for signs of other earth-like planets. According to JPL scientists, compared to hitting a baseball out of the park, SIM precision would be like hitting it to the next city. «If you put an astronaut on the moon and watch [him] from the earth, and the astronaut wiggles his index finger,» another scientist observes ([http://planetquest.jpl.nasa.gov/SIM/sim\\_index.cfm](http://planetquest.jpl.nasa.gov/SIM/sim_index.cfm)), «that is a motion that SIM could detect.»



partner

## AllTech Precision Inc.

Country	USA
Production	Prototype, precise production of intricate hardware
Target market	USA and International
Employees	3
Founded	2001
EDM systems	1 Agiecut Excellence 2 with integrated A Axis 1 Agiecut Sprint 70 1 Agiecut 100 1 Agietron Impact 2 with integrated A Axis
Programming	DP Technology Esprit Cad System
Certified	AS9003
Clamping systems	System 3R
Measuring, testing	Nikon Microscope, Trimos, Zeiss CMM

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AllTech Precision Manufacturing & EDM

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28310 Avenue Crocker Suite E

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Valencia, CA 91355

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USA

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Phone: 661.295.1646

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Fax: 661.295.1016

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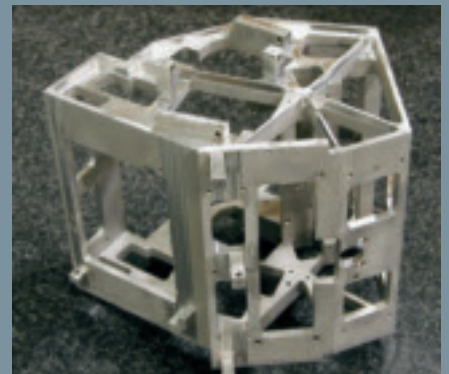
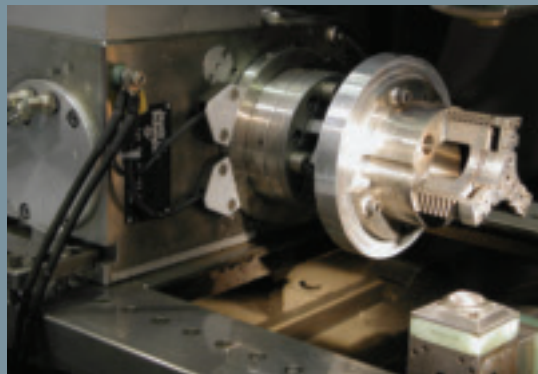
DanM@AllTechPrecision.com  
LeonR@AllTechPrecision.com

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[www.AllTechPrecision.com](http://www.AllTechPrecision.com)

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Contact Danny Minikus  
Leon Ruther



# EDM is the solution of «non-machinable» parts

## Vision and future of AllTech

AllTech was founded in 2001 to give the industry an alternative for complex mechanical hardware manufacturing. Quality, reliability, flexibility and economic viability had to be the standards. A dynamic approach and machining with function in mind would set us apart from other high precision shops. We felt the need to think beyond normal 4-axis manufacturing, and integrated a fifth and sixth axis, respectively, into our die sink and wire machines. Taking all of this into consideration, we believed wire and die sink EDM had to be the cornerstone of our operation. It has been exactly this concept that has helped us to be successful.

AllTech rapidly established itself as a crucial supplier for many icon companies involved in deep space exploration, aerospace, ultra-precision motion picture cameras and medical devices. With a clear vision, and the right customers and suppliers, we can see a very positive and predictable future.



The flexure mount was machined from 6AL4FV titanium for the Jet Propulsion Laboratory's Space Interferometry Mission. The overall diameter of the workpiece is 4.5" and it was cut using an Agiecut Excellence with an integrated A axis. In the process, the flexure mount tool path is generated from a solid model and transferred to the Agievision control in the piece editor. The necessary modifications and changes can be made decisively. Manufacturing the part with one setup ensures a higher functional quality and extended runtime.

Detail of the housing for the dither mechanism of a beam launcher.

In the middle is shown a shneck triple lead thread, made of 99.9% pure tungsten. It was manufactured in its entirety using only the Agiecut Excellence wire EDM (with integrated A axis).

The housing for the dither mechanism of a beam launcher was machined using both the Agiecut Excellence with integrated A axis and the Agietron Impact.



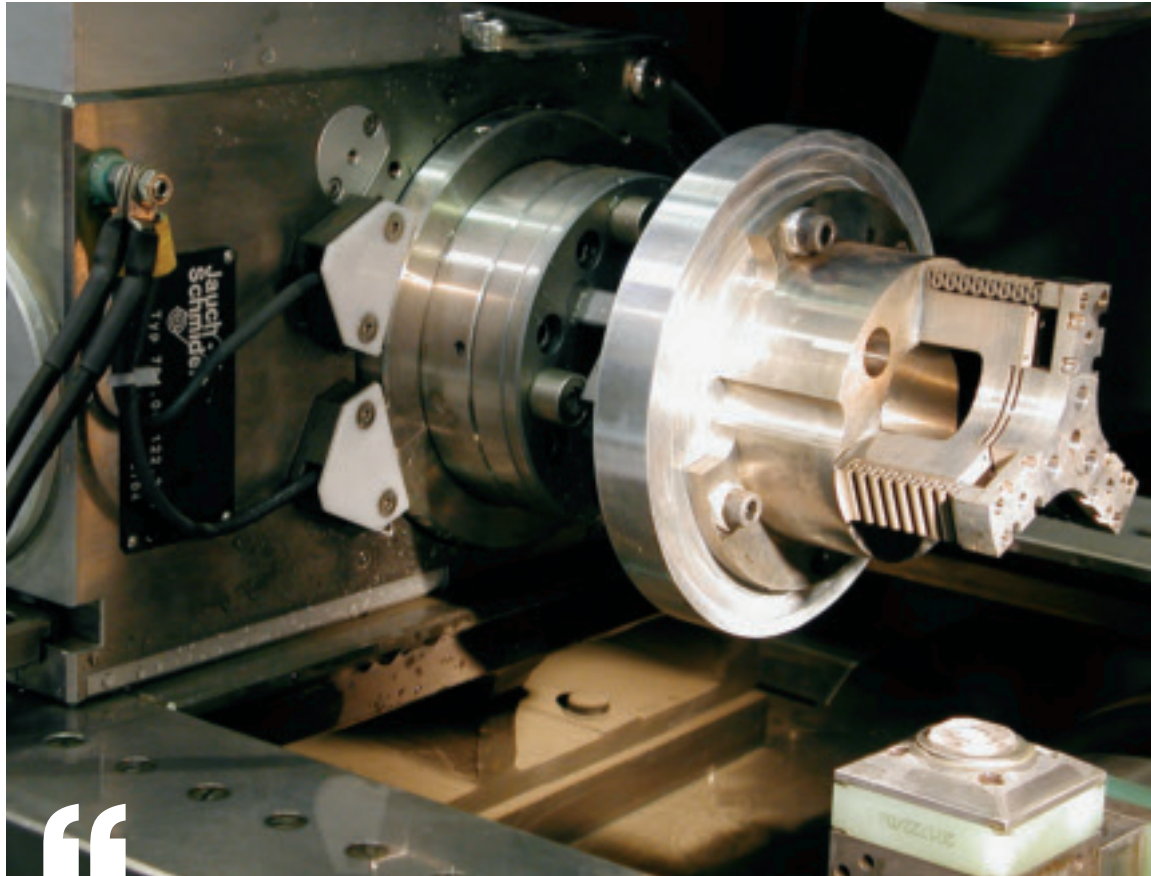
## AllTech Precision, Inc.

**EDM replaces many other machining techniques**

In today's high-end EDM applications, exotic materials and ultra precision become a standard. We at AllTech believe EDM with its uniqueness, along with Agie's extensive technology database, have to be considered the engineer's first choice. We should not forget that the EDM process allows you to create part features that are smaller, with tighter tolerances than most other types of machines can hold. With all of this in mind, engineers will dream about the possibilities of tomorrow.

**EDM solves geometrical problems of applications**

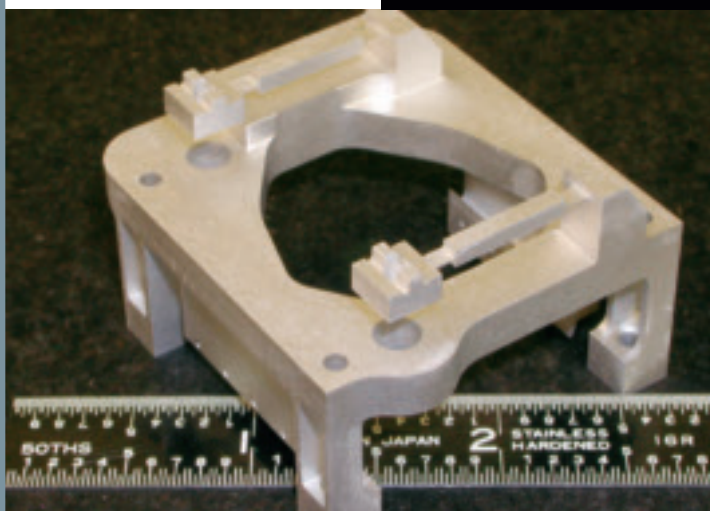
For AllTech, the following represents a typical process: the flexure mount tool path is generated from a solid model and transferred to the Agievision control in the piece editor where the necessary modifications and changes can be made quickly and decisively. The workpiece is fixtured at the A axis of the Agiecut Excellence, which gives AllTech the freedom of using one more dimension to manufacture complex and difficult parts. Manufacturing parts with one setup ensures a higher functional quality and extended runtime. In this case, there were 3 machining steps, with a 120-degree radial rotation between each step.

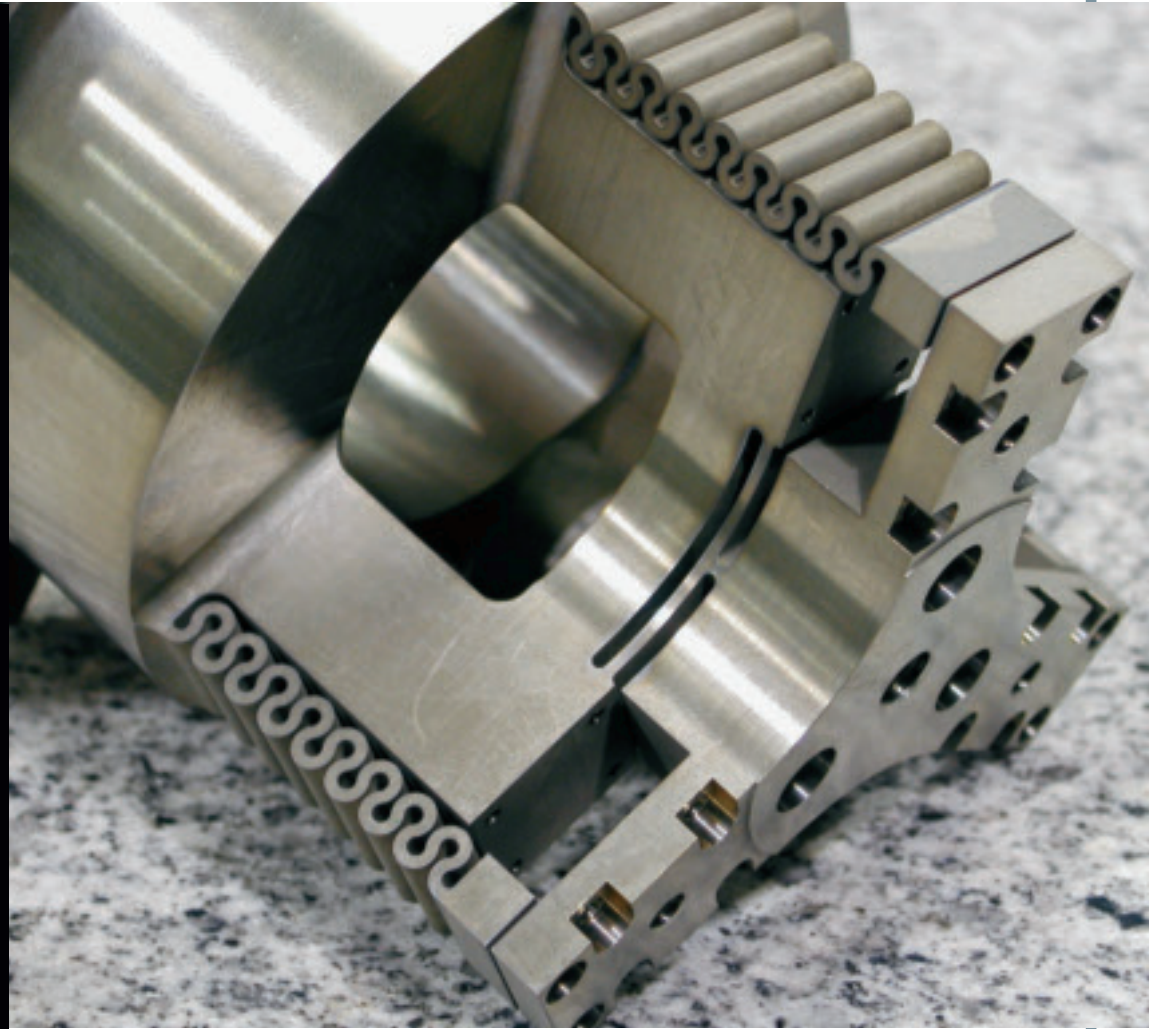


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We, at AllTech, strongly believe that Agie is ahead of the competition in regards to its concept of EDM, and surely keeps you ahead in today's ever-challenging manufacturing environment. Thanks to Agie systems and the Agievision control, we are highly competitive in prototype and production. Flexibility is an underrated advantage but one we feel is vital – and Agievision delivers exactly that. Multi-axis machining is brought to a new level with the integrated A-axis, which makes 5-axis radial machining on a wire EDM possible.

Danny Minikus,  
AllTech Precision Manufacturing & EDM





## The workpiece data

Designation	Flexure mount
Material	6AL4V Titanium
Dimension of workpiece	4.5" diameter
Type of wire	Cobra cut A, 0.250 mm diameter
Number of cuts	1 main cut; 3 trim cuts
Time of wire cutting	15 hours
Precision of positioning	$\pm 5 \mu\text{m}$ all over workpiece
Roughness	Ra 0.22 $\mu\text{m}$

Series of micro parts made of Haynes 188 for Space Shuttle motor manufactured on Agiecut 100 using 4 Axis machining.



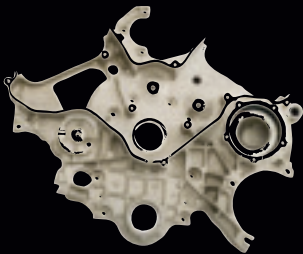
We would like to thank Alltech, especially Danny Minikus and Leon Ruther from AllTech Precision Manufacturing & EDM for their kind support and friendly co-operation with this report.

Responsible  
Sales Manager:  
Hans Baumgartner,  
EDM Concepts.



Anderson Global began as Anderson Pattern 75 years ago, serving high-volume casting manufacturers with complex tooling of unmatched quality. After 25 years under present ownership, the company is now Anderson Global, combining an extraordinary continuity of experience with cutting-edge technology, automation, innovation and a truly global approach to business.

Large tooling quantities, short lead times, complex geometry, high engineering content and the need for simultaneous development are just some of the global requirements Anderson meets today. At the same time, their technology and their systems enable them to provide tooling packages for prototype, small nature and one-of-a-kind projects with the same efficiency as large projects. And the Anderson Global product-development and customer-process consultation create additional value.



# partner

## Anderson Global

Country	USA
Production	Tooling of cylinder head molds, cylinder blocks precision sand, suspension molds, wheel molds, green sand patterns, rim molds, die cast, squeeze cast, lost foam, injection molds, prototypes and turnkey
Target market	International
Employees	120
Founded	1937
EDM system	1 Agietron Hyperspark 3, automated with System 3R
Programming	- PS Electrom Delcam - Work NC - Mastercam - Catia - Unigraphics
Clamping systems	System 3R Macro
Measuring, testing	- DEA - Brown & Sharp

Anderson Global

500 W. Sherman Blvd.

Muskegon Heights, MI 49444

USA

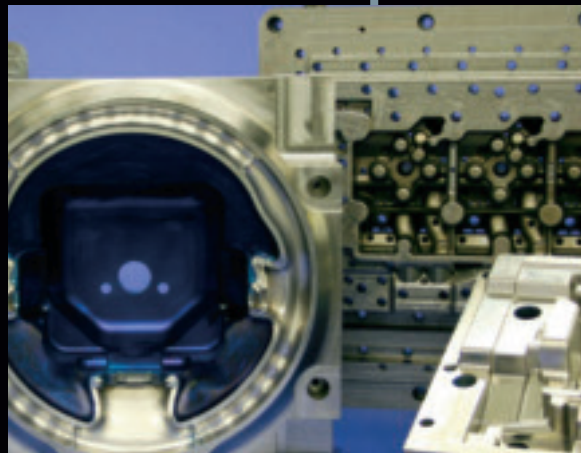
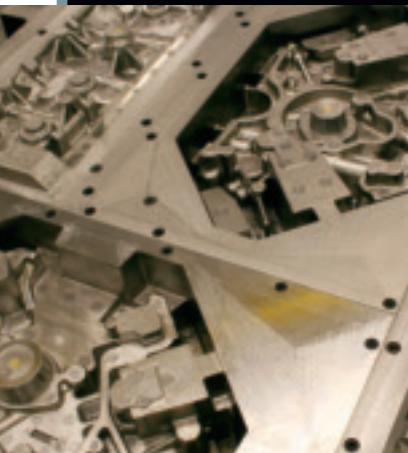
Tel 231-733-2164

Fax 231-733-1288

info@andersonglobal.com

www.andersonglobal.com

Contact Frank Marciniak, Contour Milling Manager  
Dan Arends, Sales Engineer





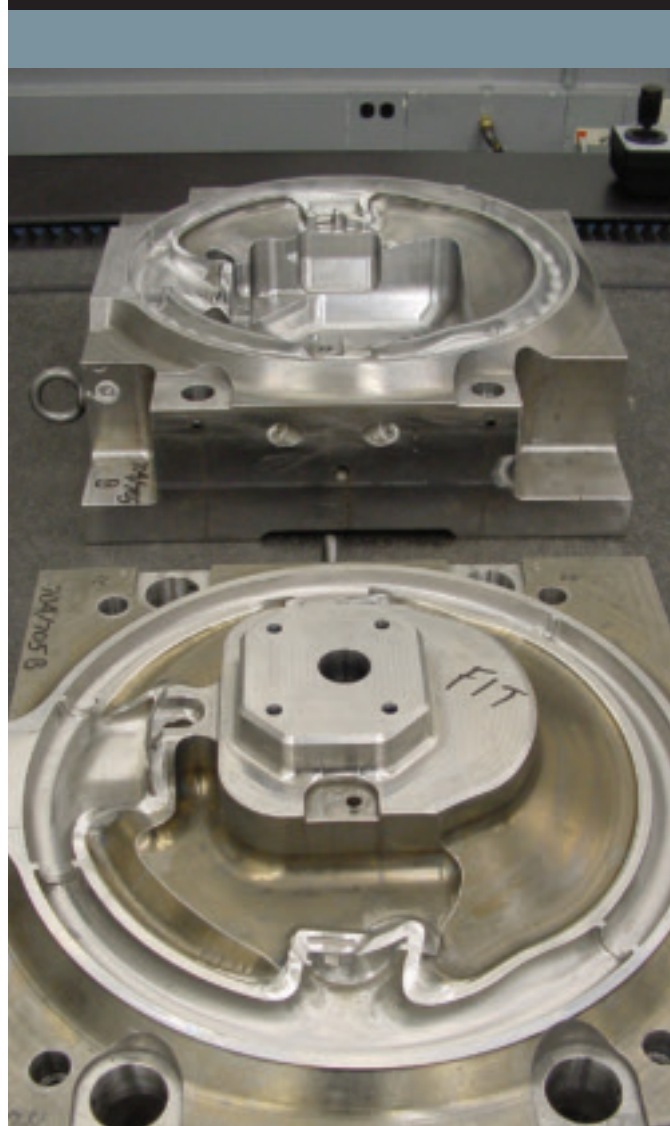
# From high-speed cutting back to die-sinking EDM

## Tool supplier to many renowned companies

With the realignment of the business in 2005, its President John McIntyre also changed the firm's name from Anderson Pattern to Anderson Global. The company's new name thus already gives expression to the fact that its business is not just limited to the home market USA, but customers from the whole world are among its clientele. Anderson Global's worldwide activity is also shown by the various manufacturing facilities:

- Production Mold in Phoenix, Arizona, USA
- Kunshan Production Mold in Kunshan, China
- Harbin Dongan Mold & Design in Harbin, China.

Further branches are planned in Mexico, Europe and other countries, clearly showing the company's strategic realignment. A success that resulted from the recession a few years ago, when Anderson Global invested in a modern plant. Since recently, this has also included an Agietron Hyperspark with handling system that ideally complements the high-speed milling that is mainly employed at Anderson Global.

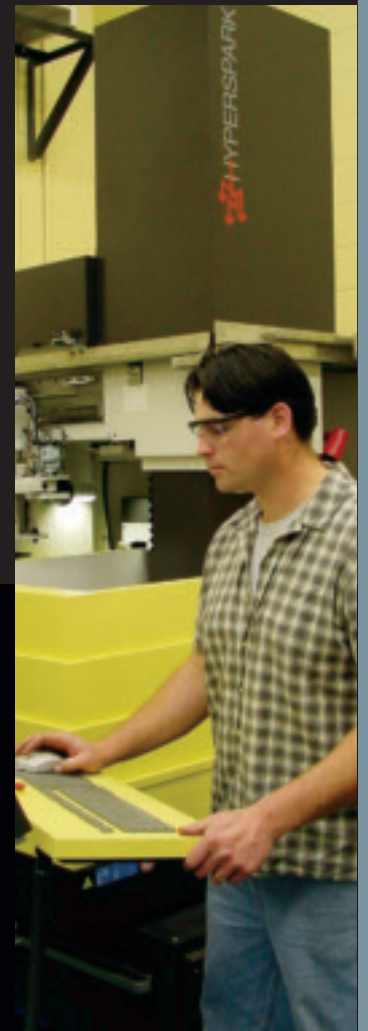


Steering wheel RIM molds were an excellent application for EDM and high-speed machining.

Graphite electrodes are manufactured with high-speed cutting (HSC).

Both electrodes and tools are checked for dimensional accuracy on the measuring machine.

The EDM program on the Agietron Hyperspark 3 can be started with just a few data inputs.



## Anderson Global

**HSC cannot really take the place of die-sinking EDM**

As, contrary to current opinion, high-speed cutting (HSC) cannot take the place of die-sinking EDM without any problems, Anderson Global is once again backing die-sinking EDM with an Agietron Hyperspark 3. Why?

1. For process engineering reasons: in the case of hard milling, many small inside radii and narrow slots cannot be machined.
2. To remain efficient, contoured surfaces shouldn't be produced using HSC.
3. HSC of hardened steel requires a greater programming effort than programming for electrodes.
4. The costs for tools (milling cutters with different lengths, diameters and hardnesses) are relatively high in the case of HSC.
5. The number of electrodes can be massively reduced by connecting many geometries to one electrode.
6. Graphite as an electrode material can be quickly machined and is thermostable, thus increasing the reproduction accuracy.
7. Die-sinking EDM can run to the greatest possible extent in an automated, lights-out operation, meaning that night and weekend shifts can be operated, reducing costs.

Detailed justifications at Anderson Global were put into practice with the purchase of an automated Agietron Hyperspark 3.

**Automated die-sinking EDM can run day and night**

HSC and EDM were employed synergistically for manufacturing a tool for the production of Delphi steering wheels: Hard milling for large mold areas and die-sinking EDM for small and complex cavity areas. Some data on the manufacture of the tool and its use:

- After completion of the hard milling, complex detailed were EDM machined with graphite electrodes.



Die-sinking EDM runs without any problems in unsupervised operation.

An ideal automation solution with die-sinking EDM was found for Global Anderson with System 3R.

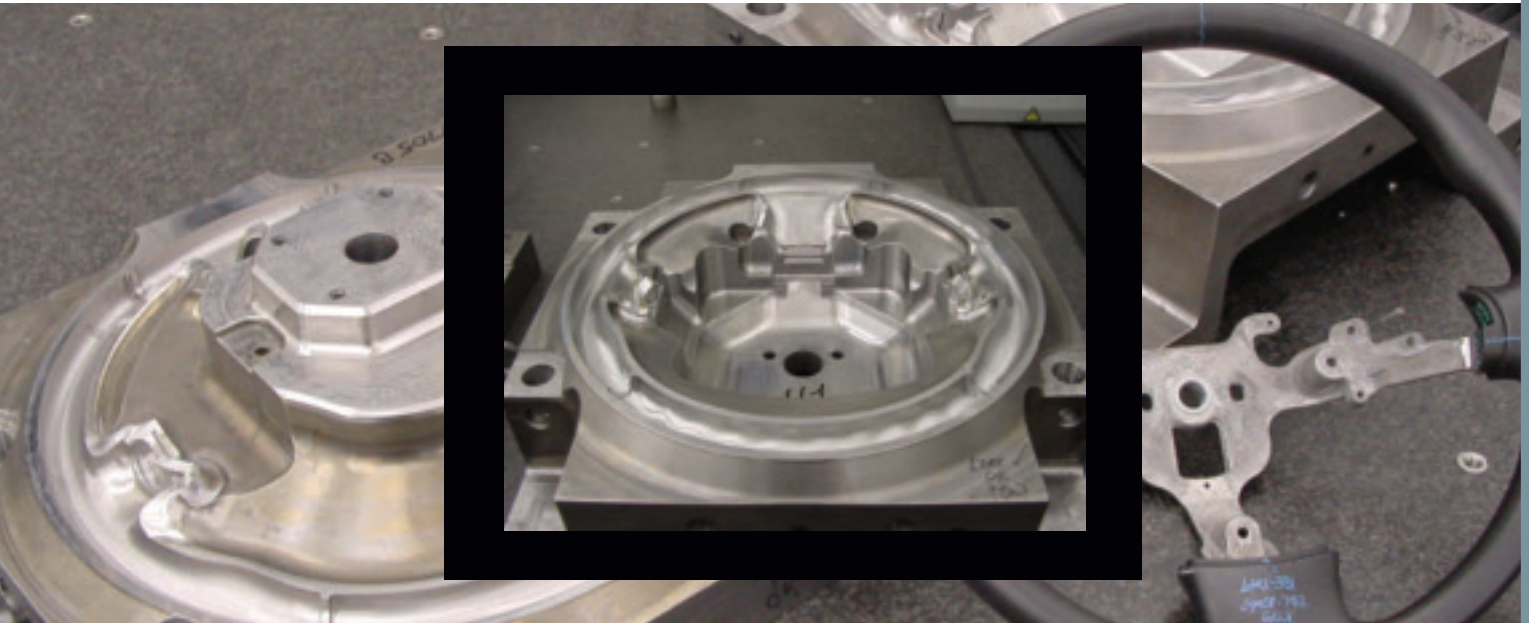
Ben Plower, programmer; Mike Anthony, operator of the Agietron Hyperspark; Frank Marciniak, Contour Milling Manager are all from Anderson Global, as well as Dave Pederson, technical consultant from Agie Ltd. (from left to right).

At Anderson Global they also measure in the largest dimensions.



- For this purpose, 1 roughing and 1 finishing electrode were used in each case which were fed and removed by means of the 28-fold electrode changer on the Agietron Hyperspark.
  - The workpiece and electrode positions were determined by means of the Agiesetup 2D's measuring cycles and allotted to the machining parameters by the Agievision control unit.
  - On the areas where EDM was involved, the required surface quality of VDI 27 was achieved.
  - The share of die-sinking EDM in the total manufacturing time was 10 hours.
  - From the design to the finished tool, the total time required was just 6 weeks.
- The visual and CMM inspection of the tool was carried out internally.
  - The sequence of functions for steering wheel production is then as follows: The arbor, which is cast magnesium with integrated spokes, is placed in the mold, then the two halves of the tool are closed and RIM molded with urethane foam. Then the steering wheel is removed from the mold.

Innovation in tool and mold making, with which Anderson Global serves its customers worldwide, provides the company with an ever expanding market.



## The tool data

Designation	RIM injection mold over metal arbor
Finished product	Delphi steering wheel
Material of tool	P 20 steel
Weight of tool	120 lbs (54,4 kg)
Service life	2 millions
Machining of electrodes	HSC (High Speed Cutting)
Material of electrodes	Graphite
Number of electrodes	1 roughing, 1 finishing per cavity
Time of die-sinking	10 hours
Roughness	VDI 27

“

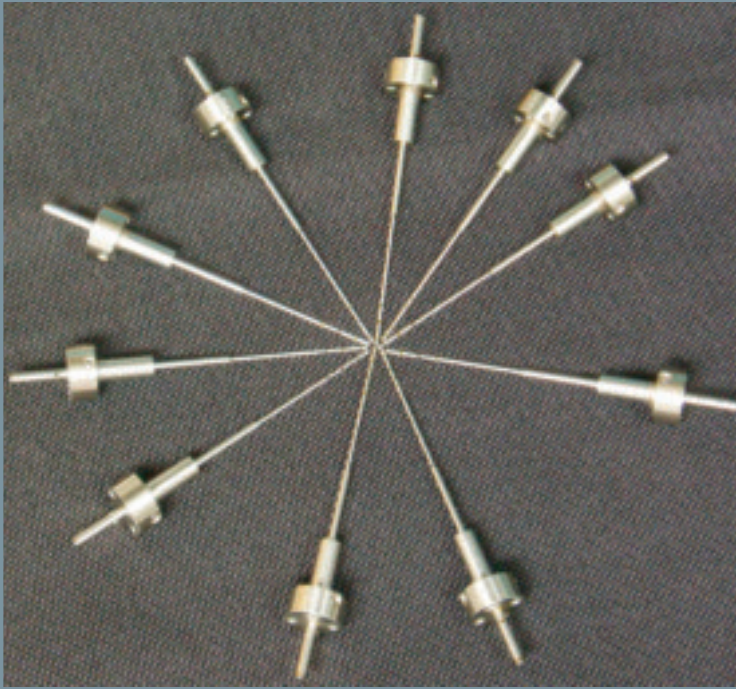
The use of die-sinking EDM is not just a sensible complement to high-speed cutting in our process as a whole, but EDM also makes high-speed machining more productive at Anderson Global thanks to improved throughput caused by EDM in difficult areas to machine.

Frank Marciniak,  
Contour Milling Manager of  
Anderson Global

”

We would like to thank Anderson Global, especially Frank Marciniak, Contour Milling Manager and Dan Arends, Sales Engineer, as well as Bob Byers, Representative of C. B. De Korne, Inc. for their kind support and friendly co-operation with this report.

Responsible  
Sales Engineer:  
Bob Byers,  
C.B. Dekorne



Die Technology is an innovative tooling manufacturer with a well established record for high quality and precision. Founded in 1988, Die Technology designs and builds precision stamping dies, tools, and fixtures for the medical, electronic, and telecommunications industries. We also provide custom wire EDM that is outsourced to us by a wide range of manufacturing companies in the Minneapolis/St. Paul market area.

## Die Technology

Country	USA
Production	Designs and builds precision stamping dies, tools, and fixtures
Target market	Medical, electronic, and telecommunications industries
Employees	12
Founded	1988
EDM systems	1 AC 50 3 Agiecut 315DEMs 1 Agiecut Evolution 2 1 Agiecut Progress 2 1 Agietron Spirit
Programming	Solid Works, SurfCAM, ESPRIT
Clamping systems	System 3R, custom solutions
Certified	Currently implementing ISO 9001:2000 quality system and anticipates certification during the fall of 2006
Measuring, testing	Mitutoyo, Fowler, Starrett

Die Technology Incorporated

8820 Jefferson Highway

Osseo, MN 55369

USA

Phone: 763.424.9677

Fax: 763.424.8766

dskoog@dietechnology.com

www.dietechnology.com

Contact Mr. Jerry Mader, Owner  
Mr. Dale Skoog, Owner/General Manager

# Precision and Value in Wire EDM

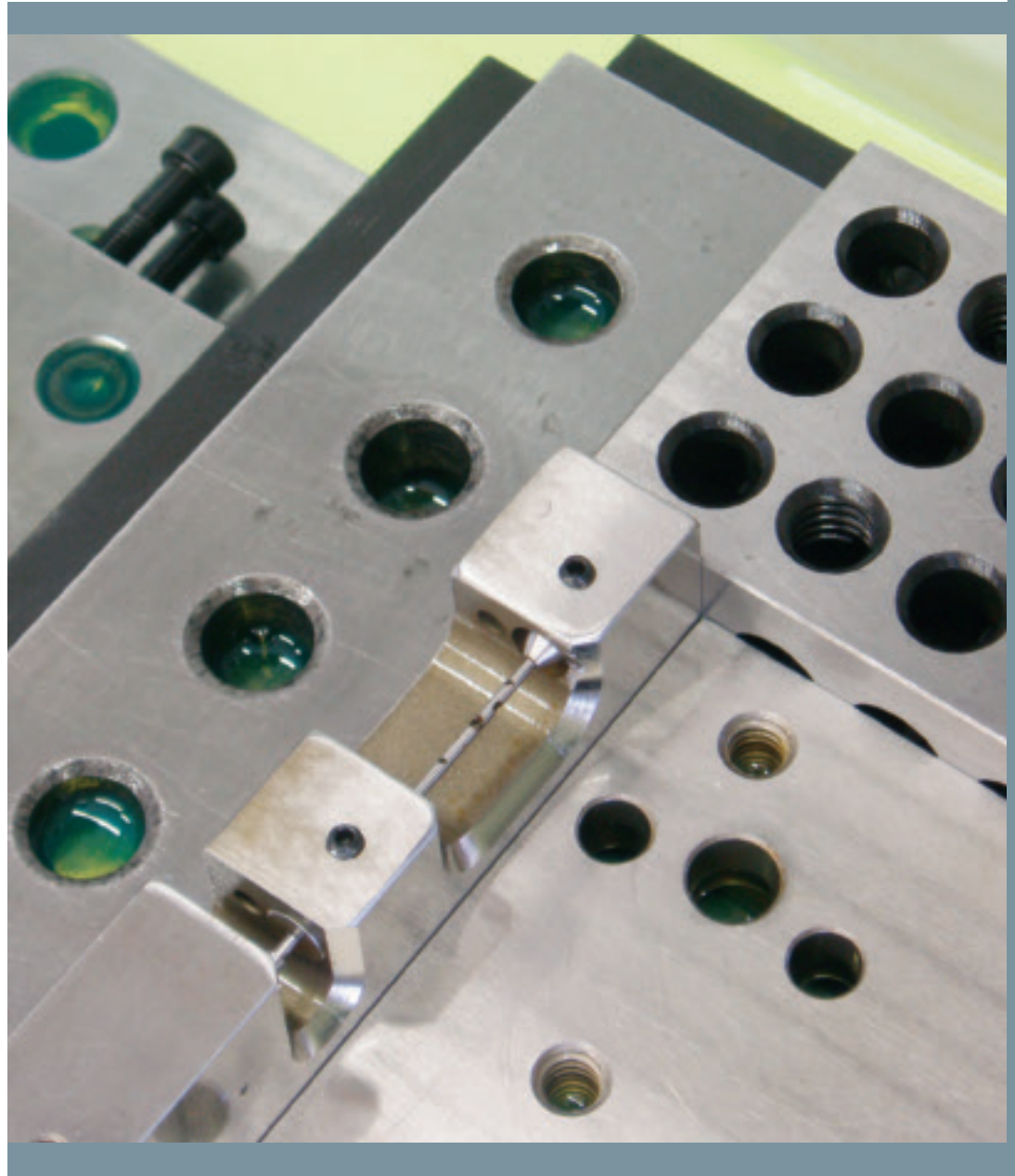
From the outset Jerry Mader recognized a market for precision wire electrical discharge machining and precision die manufacturing. The company grew and prospered by employing highly skilled toolmakers and providing them with high accuracy wire EDM and tool room equipment to provide customers value in precision machining.

Prior to opening the doors of what is now Die Technology, the company founder, Jerry Mader, had owned and operated two Agie 315DEM wire machines and they are still running everyday in his shop today. As co-owner Dale Skoog notes, «From 1980 until today, the 315's have delivered accuracy second to none.»

## A temporary defection

In the mid-eighties, Jerry Mader had an experience that was unfortunately all too common. He evaluated the new Agiecut 100 series. He was not impressed with what he saw and switched to Mitsubishi, buying an SX10, an SX20, and a 110HA in that period.

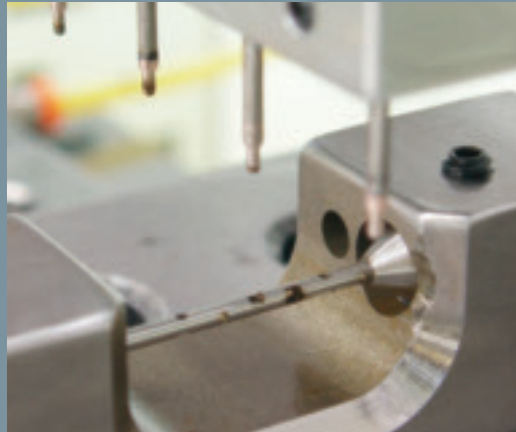
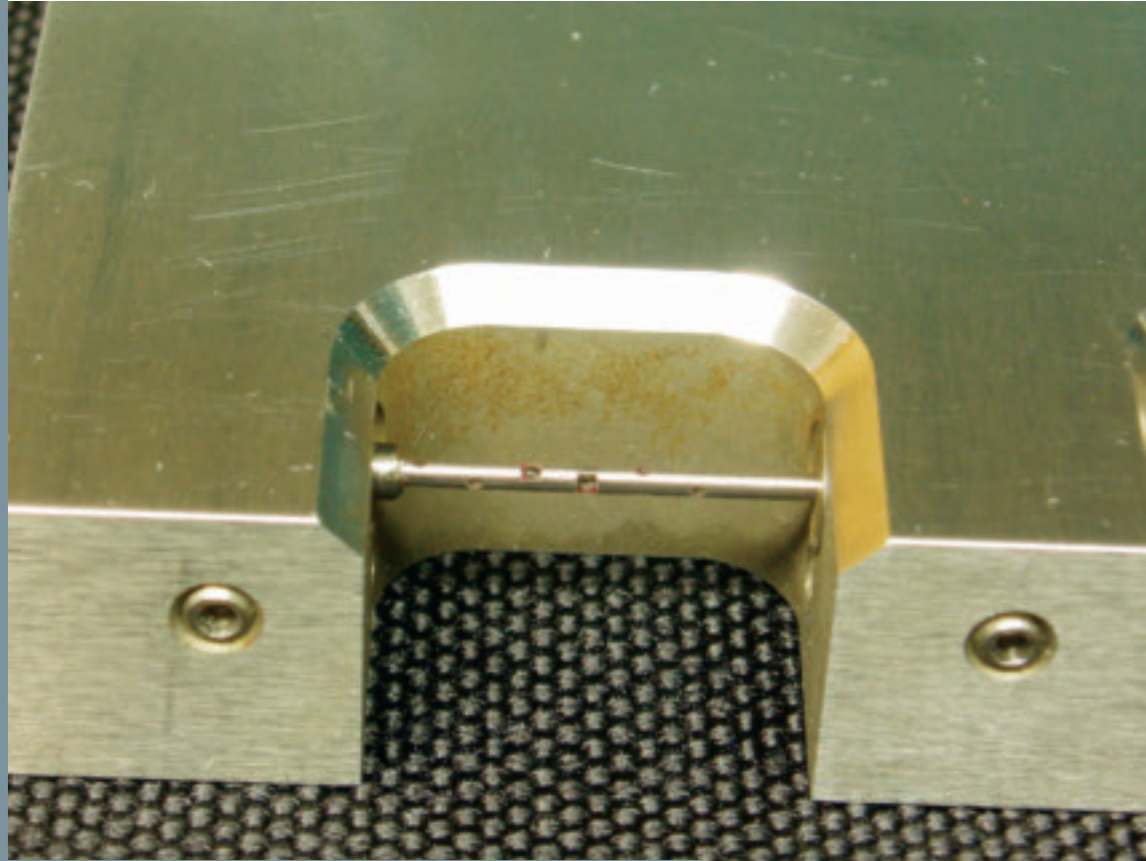
«After five to six years the Mitsies got 'loose',» Dale Skoog relates, «and the autothreaders were unreliable. We came back to Agie, first in 2000 when we acquired our Agiecut Evolution to replace the 110. Next, we brought in the Progress and Agietron Spirit. All three have added important capabilities to Die Tech's shop floor.»



The fixture (above) has two openings for machining access. There are six die holes for punching and one hole where a through beam product sensor is used.

**Die Technology****«Living and succeeding  
in an environment where  
others perish...»**

To do just that, Die Technology focuses on the kinds of applications that other shops can't handle or rather avoid. One significant part of their business, for example, is keypad dies for cell phone manufacturers. Although virtually all of the manufacturing is done in Asia, Die Tech continues to produce these dies. Why? Because the job involves stamping of 0.002" stainless steel, to 0.0002" tolerance while holding roundness and true position on all openings. Die Technology runs one manned shift, then it's lights out, so they have to have absolute reliability of their EDMs.

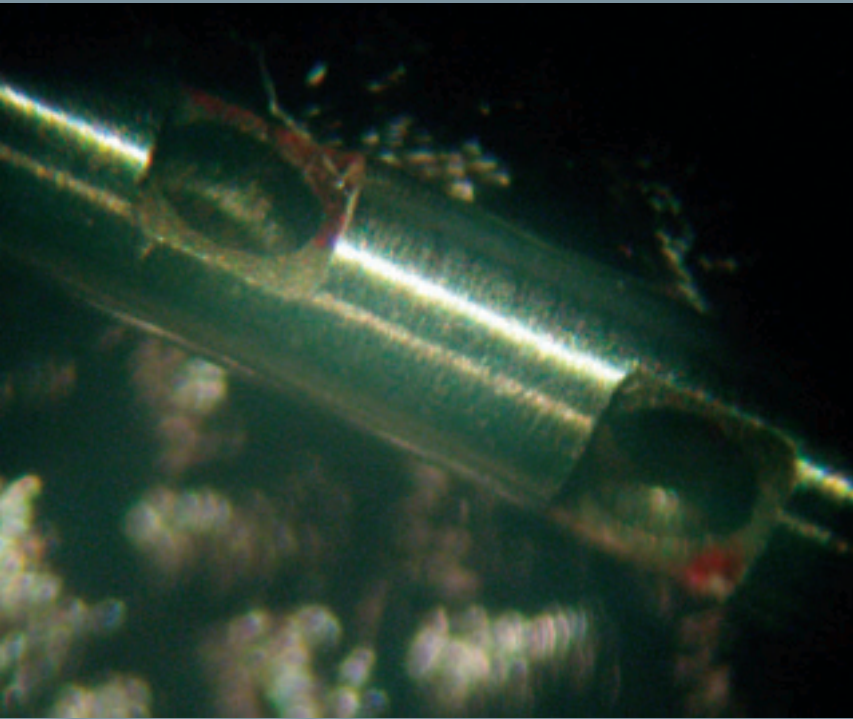


Die holes and chuck (left) with four electrodes for sinking the die relief counter bore.

Another tough application came to Die Tech from a medical company that needed a better process for punching multiple holes in the sidewall of a catheter, because drilling the holes with a core drill was proving unsatisfactory. Die Tech designed and manufactured a prototype single-hole punch to create a hole 3.5" from the end of the catheter. The prototype worked so well that the customer asked for a model that would punch six holes simultaneously in a radial pattern.

The challenges included a 0.0001" punch-to-die clearance that requires 0.0001" true position tolerance on multiple components. The fragile mandrel cross-section requires an EDM process that doesn't affect the properties of the base material, either in the die opening or the die relief. Any micro cracking whatsoever would lead to premature failure of the mandrel.

The Agie Spirit achieves the same finish in the die relief as the wire EDM finish in the hole, with no degradation of the base material. Finally, replacement components must be compatible with equipment manufactured years earlier.



Close-up of the die relief counter bore  
created by the Agietron Spirit 2.

### The tool data

Designation	Precision hole punching equipment
Finished product	Pebax tube, 0.070" OD, 0.045" ID
Material of tool	M-2 steel 62-64 R/C
Service life	75,000 cycles
Type of wire	GISCO COBRA CUT A

“

We use Agie equipment today because of process consistency, superior technology, and overall reliability. When we purchased the Evolution 2, we realized a significant increase in unattended cutting, better accuracy, better finish, and reduced processing time over the 'other brand' it replaced. This trend continued when the Agiecut Progress was installed.

Dale Skoog  
Owner/General Manager  
Die Technology

”

We would like to thank Die Technology Incorporated, especially Dale Skoog, Owner/General Manager, as well as Kevin Manion, Representative of T. Bryce & Associates, Inc. for their kind support and friendly cooperation with this report.

Responsible  
Sales Engineer:  
Everlee Dewall,  
Agie US

**ENGINEERING  
TECHNIQUES**



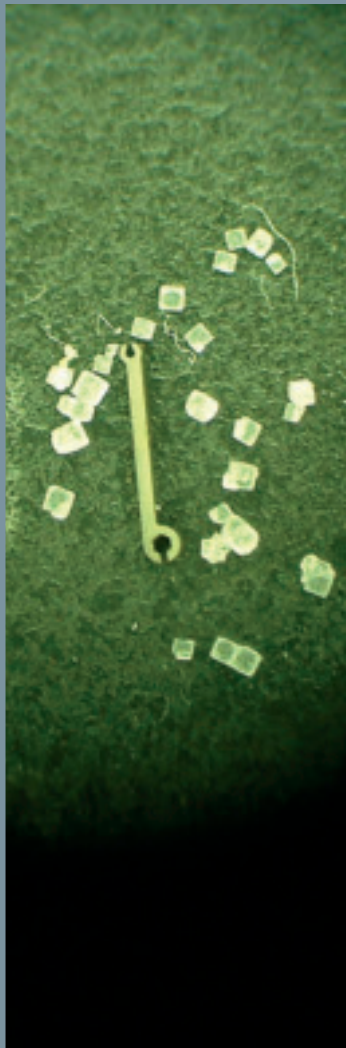
**INC.**

**partner**

## Engineering Techniques Inc.



Country	USA
Production	High-precision parts and components for the medical, biomedical and electronics industry
Target market	North America
Employees	4
Founded	1978
EDM systems	1 Agiecut Vertex 1 Agiecut Evolution 2 1 Agiecut 170 HSS 1 Agiecut 170 MMD
Programming	Camtek, Esprit
Clamping systems	System 3R, own solutions
Measuring, testing	- CNC measuring machine OGP Flash - Microscope Leica - Contour measuring machine Nikon Vision - Digital microscope Keyence - Surface measuring system Mitutoyo - Toolmakers mikroskope Mitutoyo



Engineering Techniques, Inc. has specialized in the manufacture of high-precision parts and prototypes which it supplies to companies active in the medical, biomedical and electronic fields. The business enterprise is based in Silicon Valley in California, immediately associating it with high-tech made in the USA which is also absolutely correct in the case of the company established in 1978. A wrench together with salt crystals and a needle point in magnification show the capability in the micrometer range.

Engineering Techniques, Inc.

3751-A Charter Park Court

San José, CA 95136

USA

Tel 408-267-4000

Fax 408-267-4005

agievertex@aol.com

Contact Marsh Syverson, President



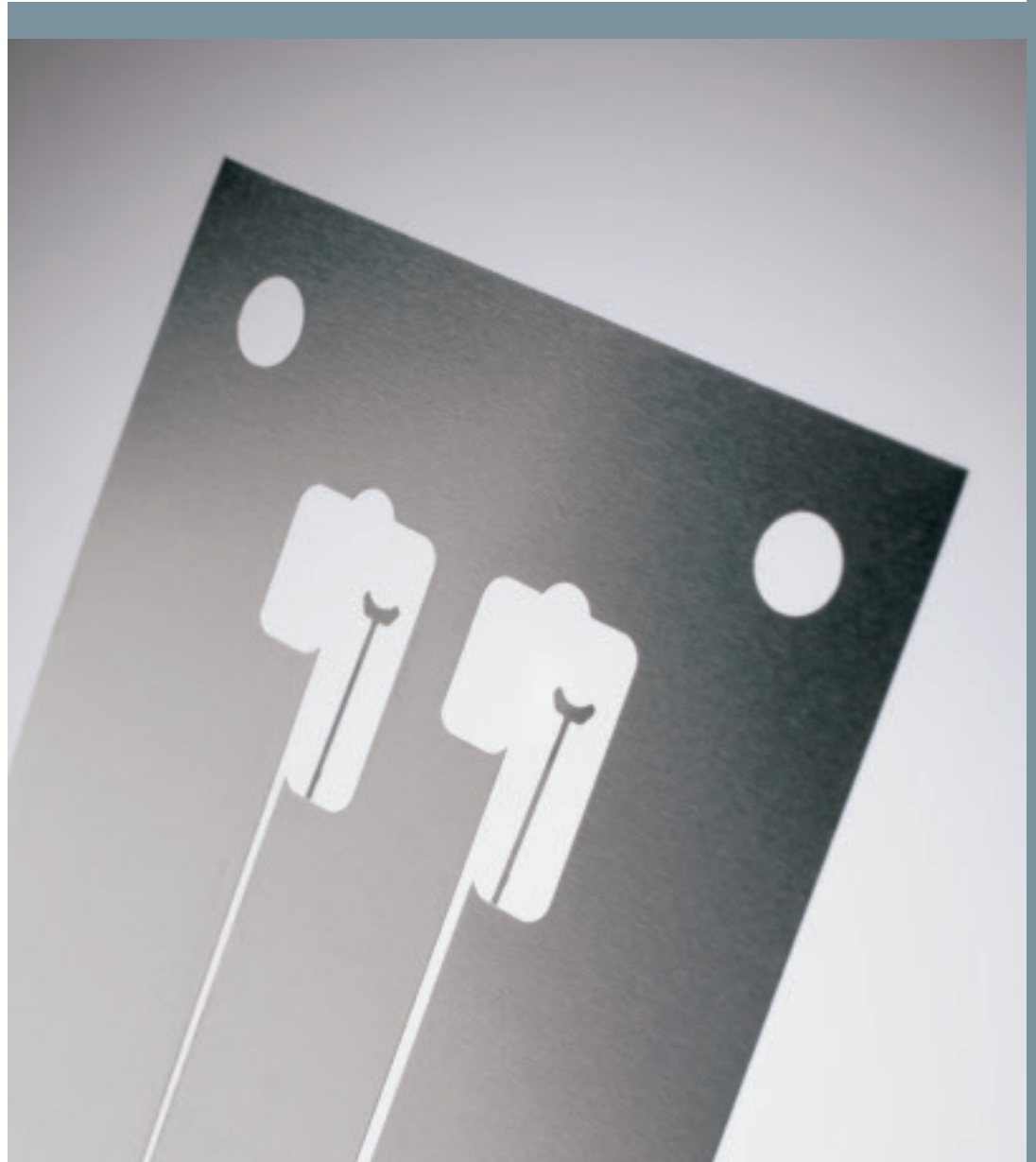


# The future has already begun with Vertex

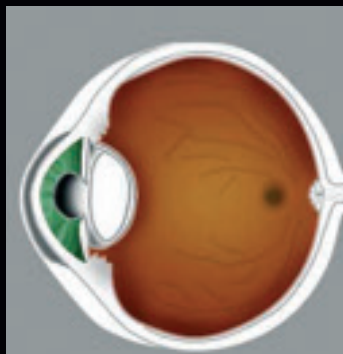
## ED wire cutting shaped the company right from the outset

When Marsh Syverson established Engineering Techniques, Inc. in 1978, he quickly discovered the enormous potential that was offered by the then still young technology of ED wire cutting. Many conventional processing steps, such as drilling, milling or grinding, could be implemented in one production stage using ED wire cutting.

So the company specialized more and more in the production of prototypes and small series of parts for medicine, electronics and biomedicine. The proximity to high-tech businesses in Silicon Valley did the rest, meeting the need for high precision prototypes and parts. There was also a call for Engineering Techniques' skills when it was a question of turning an idea, a sketch done by hand or a model into parts ready for use by means of the technology of ED wire cutting. In this case, the twenty-seven years of experience and know-how which Marsh Syverson, the owner and managing director of Engineering Techniques, Inc., had been able to acquire on EDM machines from Agie, proved useful for him.

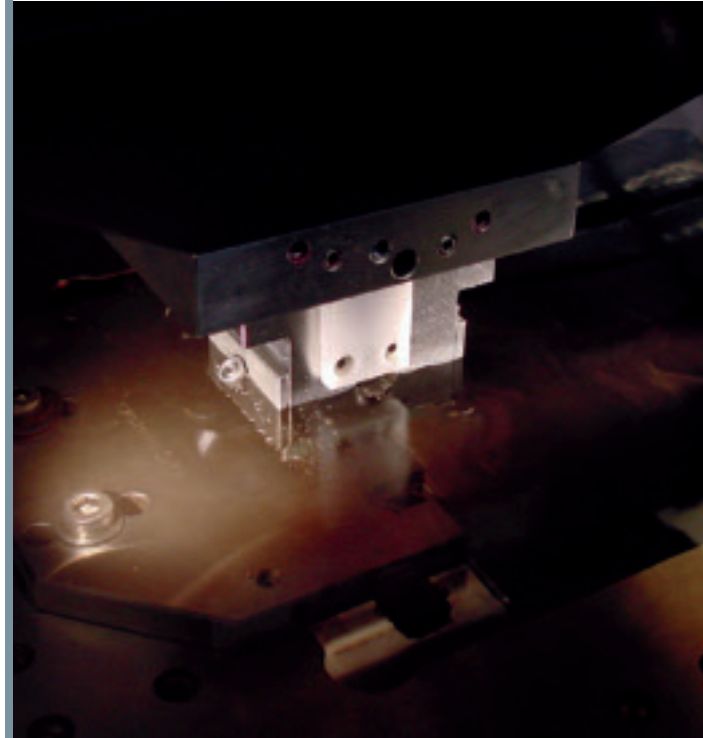


The parts cut on an Agiecut Vertex in series of 2 x 50 units in each case serve for the positioning of 2 mm small microchips in eye operations.



**Engineering Techniques Inc.****Manufacture small series economically with ED wire cutting**

In connection with a medical project for optical surgery, Engineering Techniques Inc. received the order to manufacture the parts required for positioning 2 mm large microchips in eye operations. The material to be machined were 0.0762 mm (0.003 inch) thick foils made of stainless steel 304. Owing to the high precision requirements for contour accuracy and surface quality, punching was out of the question. There remained ED wire cutting which with its reproducible precision was the process suitable for cutting these parts. For this purpose, 50 foils were stacked at a time and pressed between two thicker plates. This had a twofold advantage: It was possible to machine the foils vibration-free and produce 2 x 50 foils per clamping. For fixing purposes, Engineering Techniques, Inc. designed a kind of clamp that were manufactured by means of ED wire cutting. For this purpose, the whole stack was clamped as a package, the starting holes drilled and then adjusted on the Agiecut Vertex for machining.



Agiecut Vertex means ED wire cutting in new dimensions of precision and miniaturization.

A further example of ED wire cutting in the smallest dimensions with the highest precision are needle points used in the electronics branch.

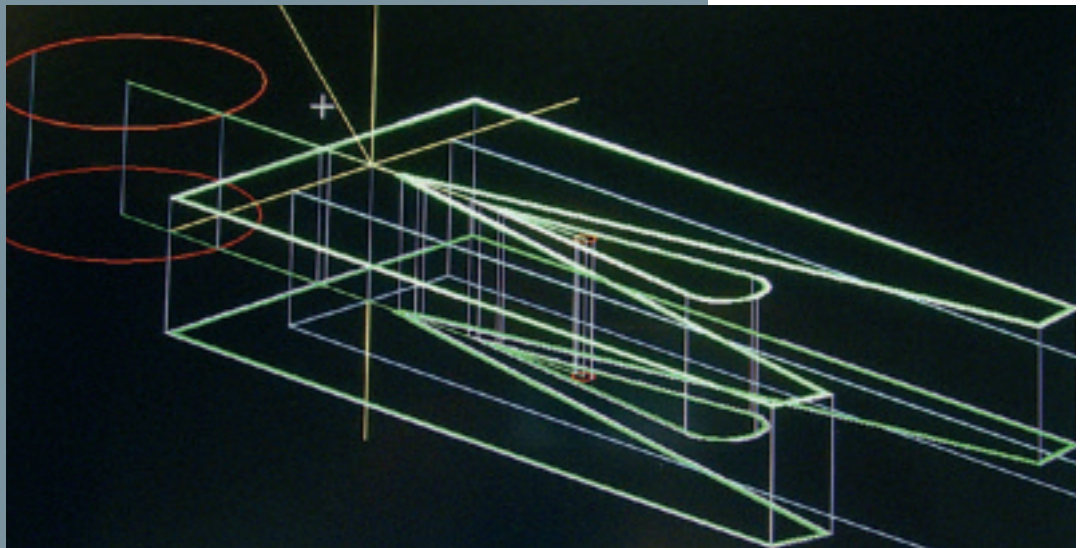
**Problem-free threading of finest wires**

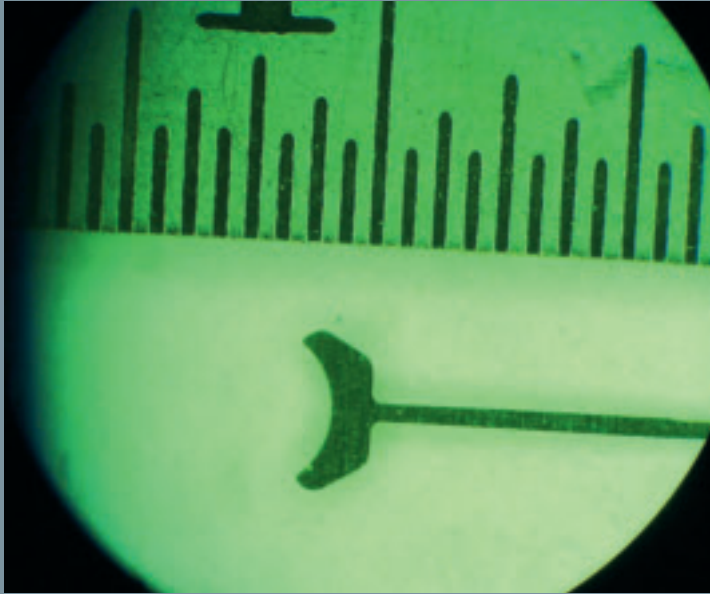
First of all, the 6 circles were machined with one cut. Then the crescent-like contours as well as the lower part of the positioning instruments were cut free. In order to achieve the required surface quality of Ra 0.1 µm, three trim cuts were carried out on the crescent-like section. In order to ensure the highest contour accuracy without physical influences, the long web of the parts was only cut free at the end with one cut.

The following capabilities and characteristics of the Agiecut Vertex were assessed as being extremely positive:

- The reliable wire threading, with even the finest wires in the smallest holes.
- The simple employment of two different wire types thanks to double reels.
- The high contour accuracy and repeatability of the EDM results.
- The small space required for the ED wire-cutting machine.

In addition, the advice given before and after the purchase, as well as the following training on the Agiecut Vertex were felt to be very professional. «A first-class product also needs first-class service and Agie USA offers us that», observes Marsh Syverson, President of Engineering Techniques, Inc..





The stacked cut parts serve in eye operations for the positioning of microchips which can restore the vision of people blind from birth.



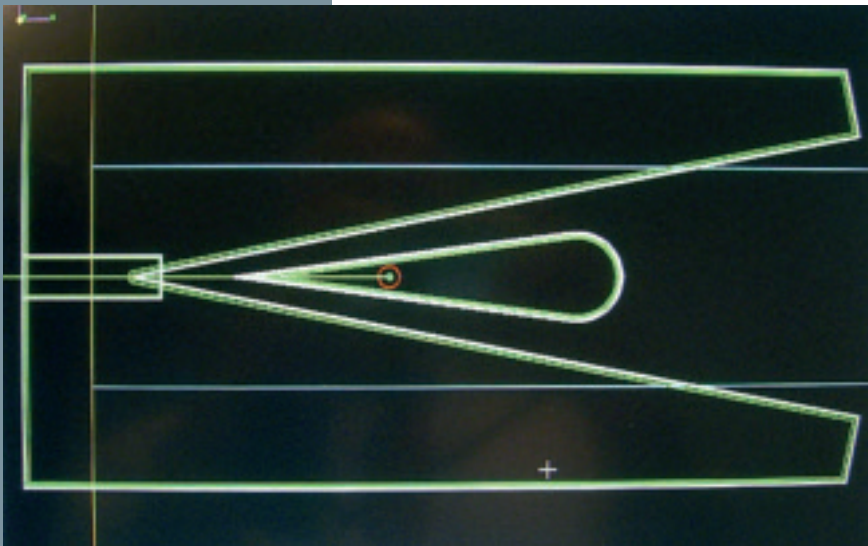
The Agiecut Vertex is the ED wire-cutting machine with which we are at last able to cut high-precision parts without the costs getting out of hand for us. The machine's compactness fits in with our cramped space situation, so that we only have to air condition a very small area.

Marsh Syverson,  
President of  
Engineering Techniques, Inc.



## The workpiece data

Name	Pusher for a micro-chip (2 mm size) to restore vision
Material	304 stainless steel, 0.003 inch thickness
Number of pieces	Batches of 100 (2 on 1 plate, piled up to 50 plates)
Number of cuts	1 main cut, 3 trim cuts
Wire type	CCA 0.1 mm
Roughness	Ra 0.1 $\mu\text{m}$ at the top of the pusher



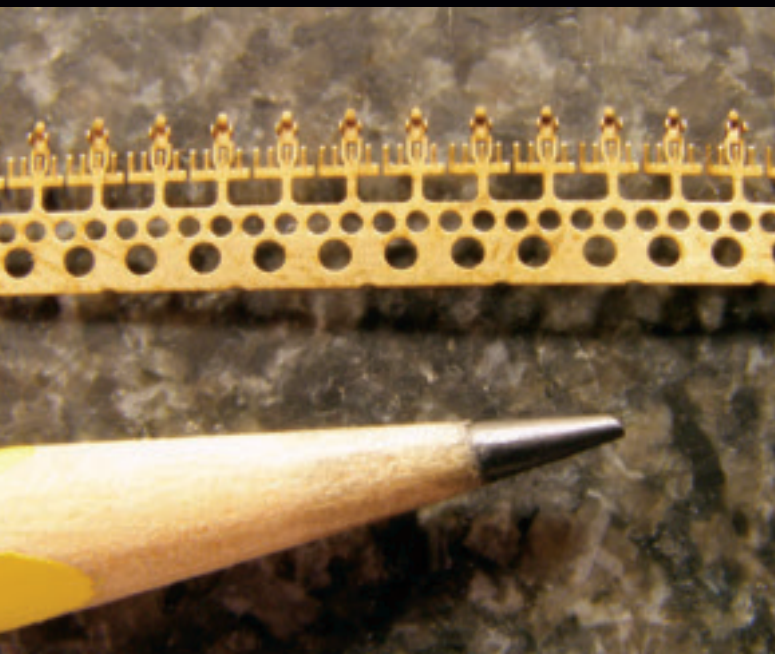
We would like to thank Marsh Syverson, President of Engineering Techniques, Inc., as well as John Servin, President of Henry Servin & Sons, Inc. for their kind support and friendly co-operation with this report.

Responsible  
Sales Engineer:  
Ken Farr,  
Agie US



Craftsmanship is a tradition at Kenmode. The philosophy: Total solutions to customer needs utilizing state-of-the-art technology along with skill and knowledge for superior results. Kenmode continues to embrace this philosophy and continues to look to the future.

Every day Kenmode implements improvements or adds new equipment. Tools are designed and built utilizing the latest in equipment and electronic design and build (CAD/CAM) technology. Skilled design engineering and tool room staff drives this technology. Training and continuous improvement day by day is the secret of Kenmode Tool & Engineering, Inc. at Algonquin, a one hour drive away from the O'Hare airport of Chicago.



# partner

## Kenmode Tool & Engineering, Inc.

Country	USA
Production	Stamping tools and progressive dies (carbide) for these industries: - Automotive - Telecommunication - Electronics - Consumer products
Target market	International
Employees	140
Founded	1960
EDM systems	1 Agiecut Progress 3, automated with Workmaster from System 3R 1 Agiecut Challenge 3 3 Agiecut 250 HSS
Programming	Peps from Camtek
Clamping systems	- System 3R - Mecatool
Certified	ISO-9001/2000
Measuring, testing	- Mitutoyo 326A optical comparator and SV-400 surface profilometer - Brown & Sharp tool maker micrometer and CMM - Nikon C12 and H14B optical comparators - Wilson hardness tester - PPT vision inspection system

Kenmode Tool & Engineering, Inc.

820 West Algonquin Road

Algonquin, IL 60102-2486

USA

Tel 847-658-5041

Fax 847-658-9150

info@kenmode.com

www.kenmode.com

Contact Kurt Moders, President  
Robert J. Lackowski,  
Vice President of Sales & Engineering  
Mike Haber, Manufacturing Manager



# Wire-cutting is key-technology for progressive die stamping

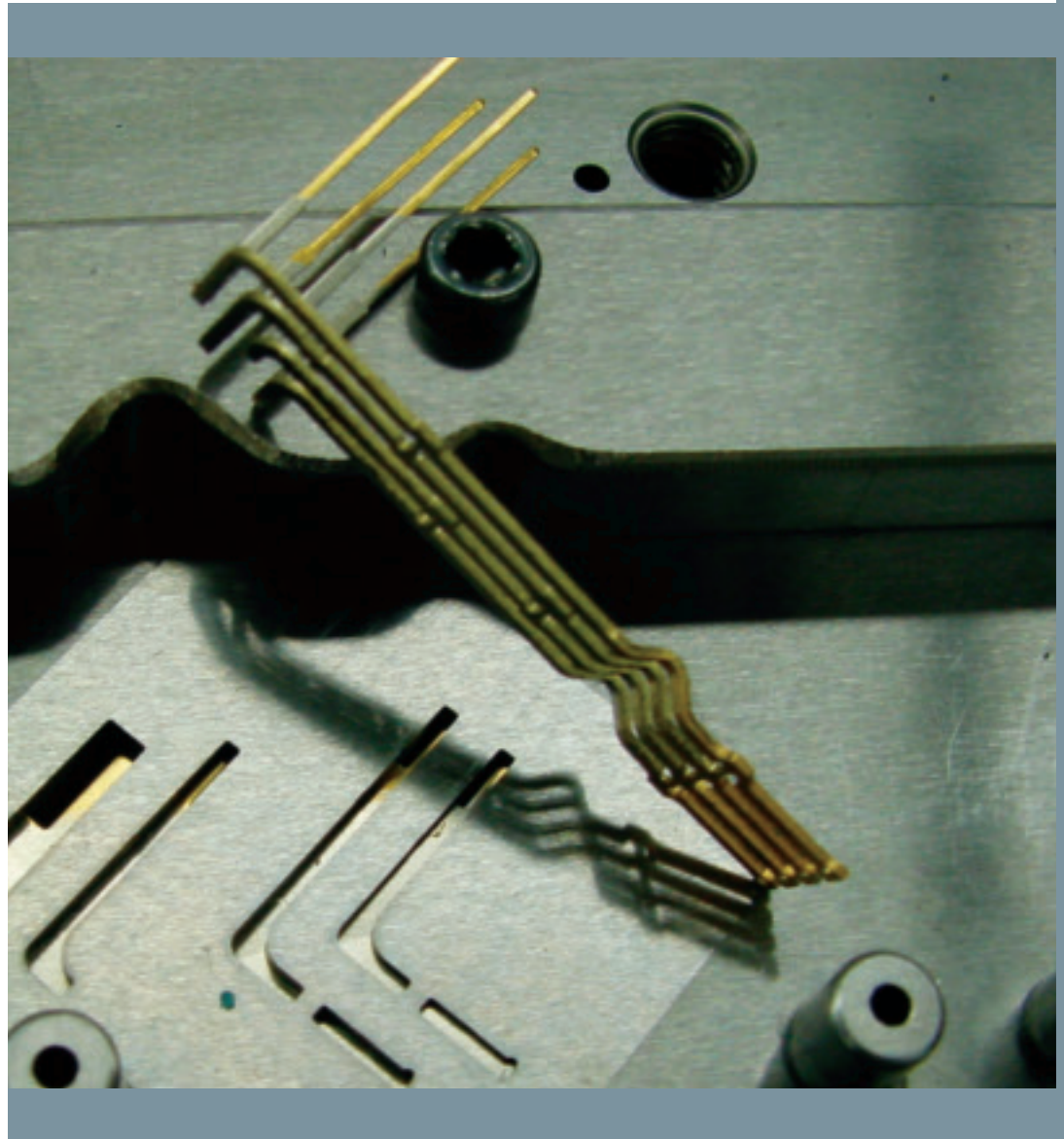
## Uncompromised quality and performance

Beginning with the company's first day of operations in 1960, continuous improvement became a way of life at Kenmode Tool & Engineering, Inc.

When Werner Moders and Kenneth Haber founded the company in 1960 with the vision to produce close tolerance metal stamping dies and run them for production in their own facility, their philosophy was simple: Build a customer base through «strict adherence to uncompromised quality and performance standards» and «customer satisfaction through continuous improvement.»

Adhering to this philosophy has resulted in customer satisfaction and continuous growth for Kenmode. Stability is also a key ingredient in the Kenmode process. The Moders and Haber families have been directly involved with daily operations from the beginning. Werner continues today as CEO, while his son Kurt is President of the company. Ken's son, Michael Haber, is the Manufacturing Manager. Years of dedication have brought Kenmode to where they are today, and will continue to drive their success in the future.

The company focuses on total solutions to customer needs, utilizing state-of-the-art technology and a highly skilled and knowledgeable staff. As the opportunity or need arises, Kenmode implements process improvements or adds new equipment. Tools are designed and built using the latest in CAD/CAM technology.



Although Kenmode has used four different generations of Agie equipment during their 46 years of operation, it applied the same rigorous process of evaluation to its most recent acquisition – an Agiecut Progress 3 – that it might have demanded of a new vendor partner. The goal: to ensure that the full value of its entire EDM department was optimized prior to signing the purchase order for its latest Agie EDM.

Unlike many EDM shops around the country, Kenmode uses the dies it creates in its own captive precision stamping operation. A changing manufacturing environment within the United States has required many tool and die makers to look outside their traditional markets and Kenmode is no exception. Once heavily reliant on its electrical connector business, the company has used its ability to design, tool and run complex carbide progressive dies to expand into the automotive

and medical markets, producing highly intricate stampings such as the one shown here.

After 46 years, the commitment made early on by Werner Moders and Kenneth Haber continues to guide the company. Although markets may change, the philosophy of good business remains the same: provide a quality product, on time, at a fair price, and remember that people make the difference.

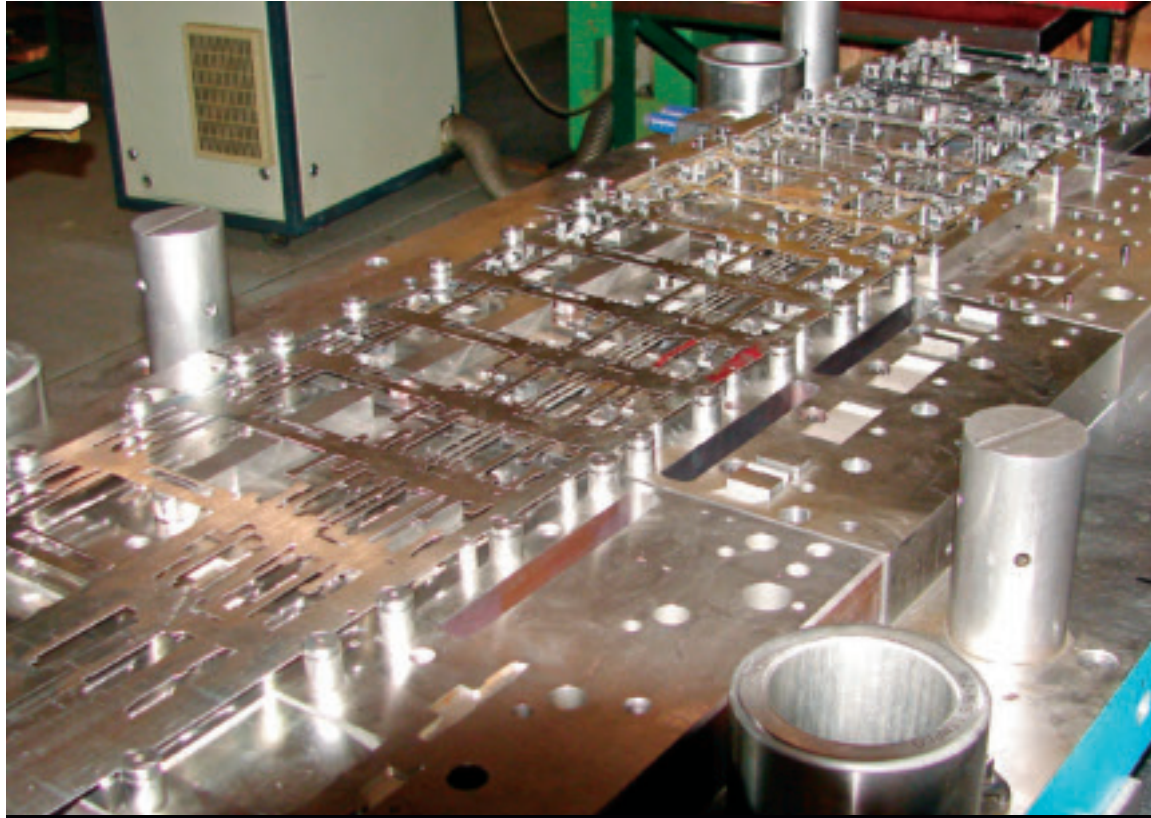
## Kenmode Tool &amp; Engineering, Inc.

**Optimized EDM machining processes**

The products manufactured by Kenmode range from very small electrical contacts to large-scale automotive assemblies that must be produced with extremely short lead times to very demanding quality metrics.

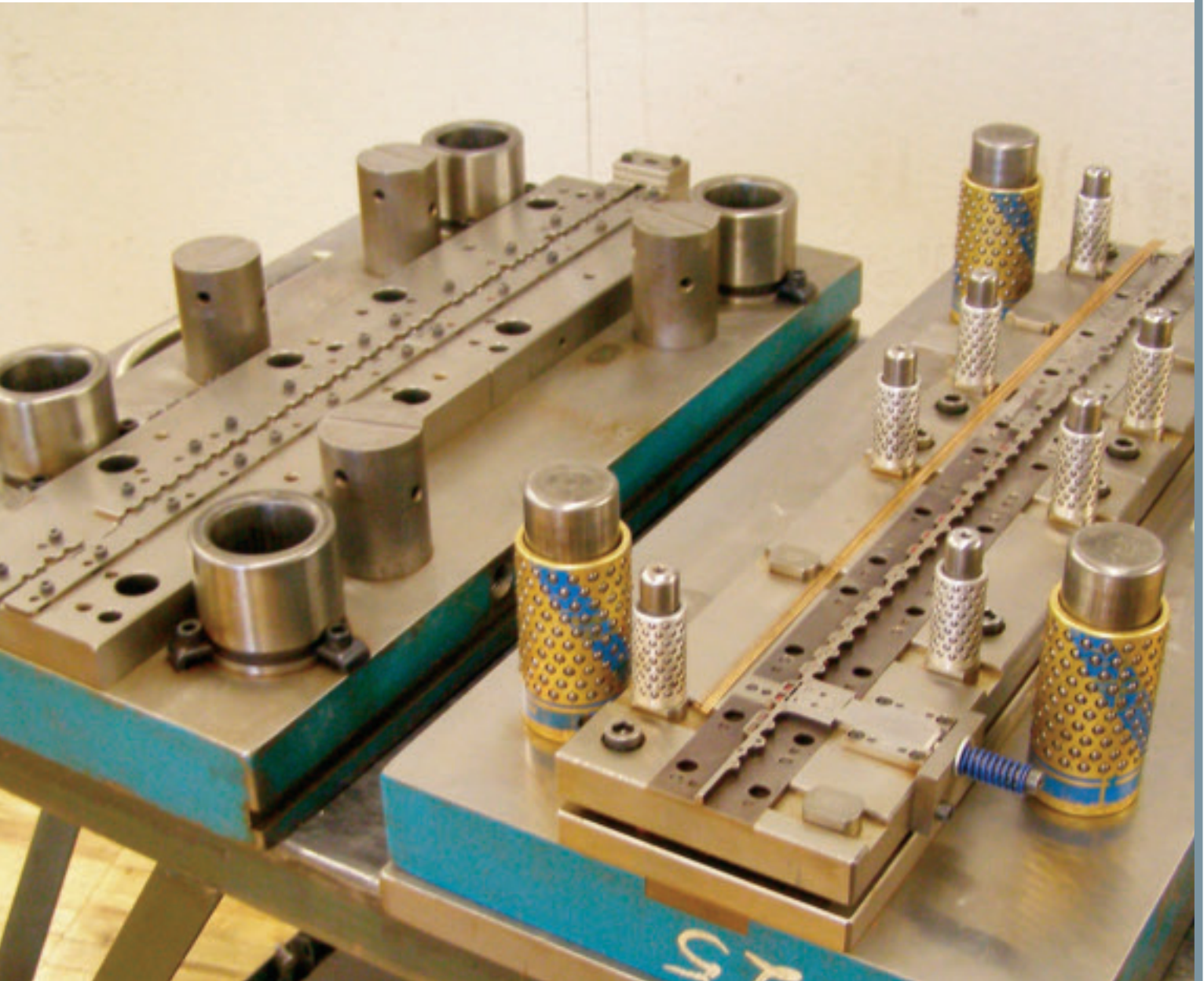
Prior to adding the Agiecut Progress 3 to their EDM line-up, Kenmode implemented an optimization program with the goal of maximizing the value of the company's existing Agie wire-cut equipment. To move into the future, the company not only wanted to improve the quality and reduce lead times of the tooling they produce, but also to reduce the labor cost component involved in the construction and repair processes.

Working with their local Agie representative, the evaluation process began with an in-depth analysis of the entire EDM operation. A program was developed that included four major elements, along with goals and benchmarks established by a team of employees at Kenmode to track the success of each of the four phases.



**Phase 1:** Evaluate individual needs and provide advanced training for all of the toolmakers responsible for the operation of Kenmode's EDM systems. Agie assisted with the development of a training program that was designed to meet the specific needs of the Kenmode staff.

**Phase 2:** Upgrade the milling-based CAM programming system to a CAM package that is designed to complement today's high-performance wire EDM systems. CAMTEK PEPS was the system selected to help improve the company's programming capabilities.



**Phase 3:** Enhance the capabilities of the existing Agievision wire systems to facilitate upgrades such as Agiesetup 3D and software options such as Usersequence.

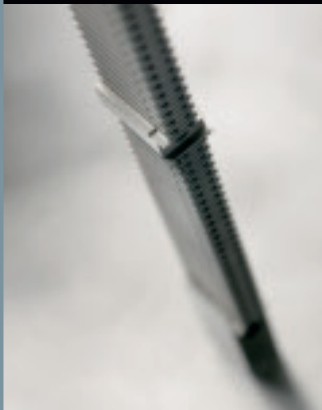
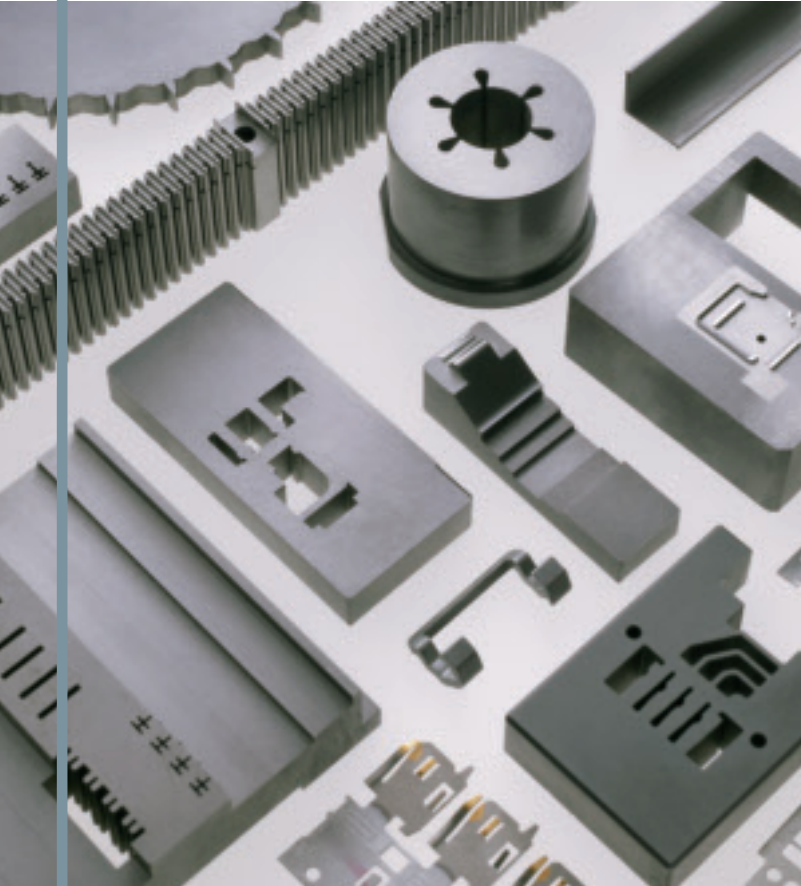
**Phase 4:** Finally, integrate Kenmode's new Agiecut Progress 3 with a System 3R Workmaster automation system with palletized workpiece handling. This system maximizes the unattended operation of the Agie equipment and allows Kenmode to routinely run 100 EDM manufacturing hours per week with a single work shift.

By partnering with Agie in this extensive process, Kenmode was confident that the promised benefits of their new Agiecut Progress would be realized in day-to-day operation. Furthermore, by including other Agievision wire systems in the evaluation and training process, Kenmode and Agie were able to enhance the operation of the entire department while creating a new level of confidence and enthusiasm among the company's EDM staff.

We would like to thank Kenmode Tool & Engineering, Inc., especially Kurt Moders, President and Robert J. Lackowski, Vice President of Sales and Engineering, and Mike Haber, Manufacturing Manager, as well as William Raye and David Carrizales, Representatives of Hitech Machinery Sales, Inc. for their kind support and friendly co-operation with this report.

Responsible  
Sales Engineer:  
Bill Raye,  
Hitech Machinery Sales

# PENNCO



Pennco Tool & Die occupies a modern, fully staffed facility of 12,500 square feet. The present home was built to their specifications in 1988, and designed to efficiently house their production equipment and office staff. Pennco expanded their facility in 1998 to include a Wire EDM department. President Philip A. Passilla and Vice President Philip W. Passilla look forward to serving your tooling and machining needs.

# partner

## Pennco Tool & Die Inc.

Country	USA
Production	Custom machining of carbide & steel dies, molds and spare tooling for: - electronic - medical and - automotive industries
Target market	International
Employees	28
Founded	1980
EDM systems	1 Agiecut Progress 2 1 Agie Evolution 2 3 Agiecut 150 HSS
Programming	- Peps from Camtek - Mecanic
Clamping systems	- Mecatool - presetting stations (horizontal and horizontal/vertical)
Measuring, testing	- J & L PC-14A Optical Comparators 4 Digital, 3 Quadra-Check - Sets starrett Grade A Cro-Blox - Sets Mitutoyo Ceramic Blocks - Complete Gauge Pin Sets - Starrett 18" X 24" Surface Plates - Mitutoyo Toolmakers Microscopes - Starrett Digi-Check Height Gauges

### Pennco Tool & Die Inc.

99 Mead Ave.

Meadville PA. 16335

USA

Phone 814-336-5035

Fax 814-336-5036

[pennco2@penncotool.com](mailto:pennco2@penncotool.com)

[www.penncotool.com](http://www.penncotool.com)

Contact - Phil Passilla, President  
- Phil Passilla Jr., Vice President





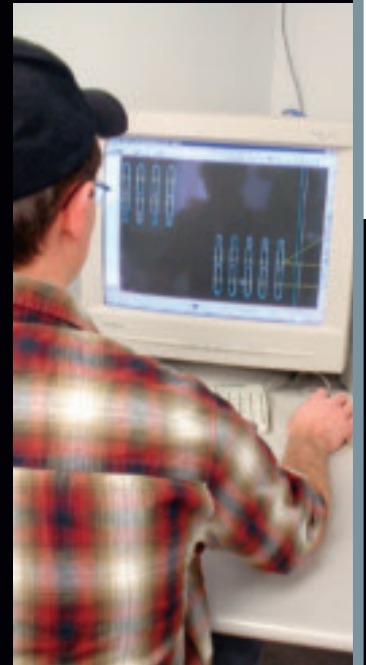
# Wire cutting is the cutting edge of precision tooling

## Supplier of high precision

Pennco Tool & Die, Inc. was founded in 1980 and is located in the heart of the tool & die capital of the USA, Meadville, Pennsylvania. Specializing in close tolerance form grinding and Wire EDM of both carbide and steel, they maintain a highly skilled work force of Journeymen Tool and Die makers and additional support staff capable of machining carbide and steel to a tolerance of  $\pm .00005$  inch. Meadville is proud of its heritage of toolmaking excellence. This evolved from the need for precision tooling used to mass produce the Talon zipper which was pioneered and successfully produced in Meadville in the early 1940's. In the late forties and early fifties, there were only about a dozen shops in the Meadville area. Today there are approximately 140 shops that supply and service tooling needs around the world. Pennco is a full service facility for steel, carbide and other machinable materials. Our distinction is the precision form grinding and Wire EDM of carbide die parts. Today with incorporation of Wire EDM, we have created a reputation for quality, reliable service and quick turn around times. Pennco is considered one of the leaders in their industry.



Pennco utilizes three generations of Agie wire-cut equipment, running around the clock with only one manned shift.



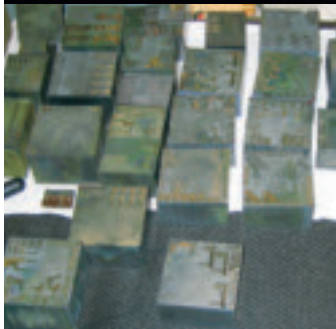
## Pennco Tool &amp; Die, Inc.

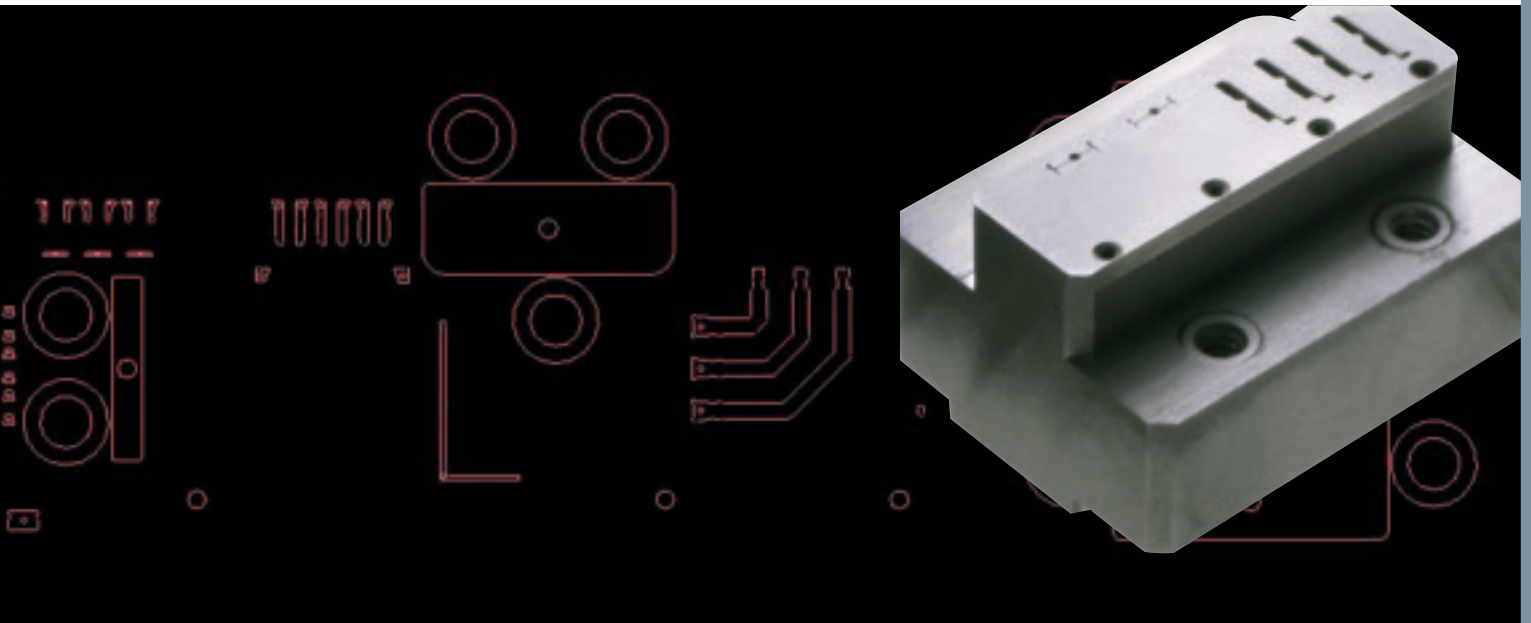
**Identical, interchangeable  
spares for the precision  
stamping die industry**

Whether Pennco tooling finds eventual application in the automotive, electronics, or medical industry, it all must meet the same requirements. Phil Passilla, Jr., notes, «When you build spare tooling, they must exactly match the originals and be reliably interchangeable.» The carbide die stripper shown on page 23 is a case in point. Part of a 10-year development project, Pennco is the sole supplier to their customer, using wire EDM and form grinding to produce a 50 millionth inch clearance between punch and stripper. «Almost all of our work is close tolerance, fine finish tooling – 70 percent of it in carbide,» Phil Passilla, Jr., states. We feel Agie machines are the best for burning carbide, he adds. They hold tolerances over time, minimize cobalt depletion and result in the best straightness and dimensional tolerances with surface finishes down to 0.2 Ra (7 RMS).

**A large network**

«With a 140-shop market to choose from, Meadville is a big network,» Phil Passilla, Jr., explains, «and we all work together, whether it's machining, plating, welding or other processing technology. This kind of access helps all of us turn around jobs very quickly, which in turns makes us more competitive as individual businesses and as a group. Our Agiecut Progress is the latest example of new technology and its impact on Pennco. It attracts the toughest jobs in the area, with other shops sending EDM work they can't handle to us.»





## The tool data

Designation	Die stripper
Designation of finished product	Spare tooling for the stamping industry
Material of tool	Carbide
Type of wire	Cobra Cut A
Number of cuts	1 main cut, 4-6 trim cuts
Precision of positioning	$\pm 0.000040''$
Roughness	Ra 0.2 (7 RMS)



Pennco Tool & Die, Inc. chose Agie wire machines over their competition for several reasons. The main reason being that Pennco's customers require high accuracy and super fine finishes for their carbide die tooling, which the Agie machines deliver. Also, we have found Agie to be very dependable, offer excellent service, and continually update their technology. Pennco is very satisfied with the Agie products and will continue using them in the future.

Phil Passilla,  
President of Pennco Tool & Die, Inc.



We would like to thank Pennco Tool & Die, Inc., especially Phil Passilla, President, and his son Phil Passilla Jr., Vice President, as well as EDM Product Manager Jim Knox of Boldt Machinery, Inc. for their kind support and friendly cooperation with this report.

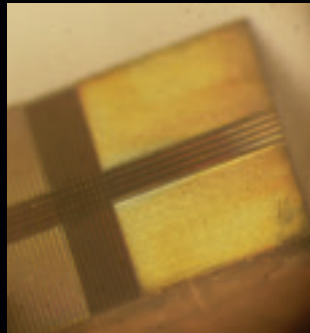
Responsible  
Sales Engineer:  
Jim Knox,  
Boldt Machinery

# RWI

An Engineering and Development Company



Ron Witherspoon, Inc. (RWI) specializes in the fabrication of high precision parts and in the development of the processes required to fabricate them economically. RWI has experience with a wide variety of materials, from aluminum and stainless steel alloys, extending to more exotic metals such as OFE copper, Glidcop, copper tungsten, beryllium copper, molybdenum, Inconel, Hasteloy X, Nimonic 90, titanium, tantalum, niobium, tungsten (90, 95, and 99.9% pure), and barium titanate.



## partner

## Ron Witherspoon, Inc.

Country	USA
Production	High-precision, intricate components for the medical and aerospace industry
Target market	North America
Employees	125
Founded	1979
EDM systems	1 Agiecut Progress 1 Agiecut Excellence 1 Agiecut Vertex
Programming	Calypso
Clamping systems	System 3R
Measuring, testing	- CNC-based Coordinate Measuring Machines from Mitutoyo, Zeiss, and Brown & Sharp - Voyager 12x12 Optical CMM

Ron Witherspoon, Inc.

Corporate Office

380 Industrial Street

Campbell, CA 95008

USA

Tel 408-370-6620

Fax 408-370-9612

ronwinc@msn.com

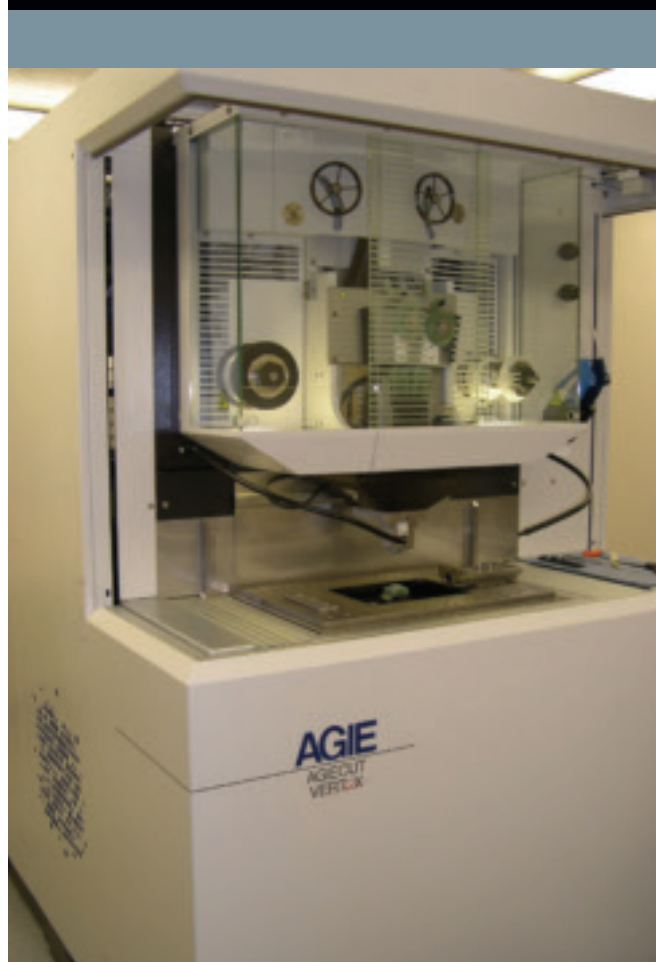
www.rwinc.com

Contact Ron Witherspoon,  
President, RWI

# When «small» isn't small enough

## A California career in Engineering and development

Ron Witherspoon, Inc. is a textbook example of the evolution of small businesses in California's Silicon Valley. Started in Mr. Witherspoon's garage over 20 years ago, RWI has grown to employ 125 people in two manufacturing facilities, which today occupy over 100,000 square feet. RWI's focus, from its beginning, has been on high precision fabrication. Early on, the company was involved with the fabrication of computer disk manufacturing equipment and test fixtures. More recently, RWI has focused on the manufacture of parts and assemblies for the medical and biomedical, semiconductor, aerospace, energy, microwave, and telecommunications industries. RWI has done many high precision chassis and microwave horns for satellite applications, as well as tight tolerance molds and parts for the medical industry.



RWI offers complete fabrication services. RWI perform virtually all machine work in their own shops, including milling (vertical, horizontal, and 5-axis), turning (manual lathe, CNC lathe, mill/turn, and screw machines), jig boring, laser welding, sinker EDM, and last but not least wire EDM with a Agiecut Vertex, (with wire as fine as 0.0008" diameter).

All work flowing through the shop is tracked on a computer network with a shop management software package (Visual Manufacturing) which supports both job tracking and scheduling and increases RWI's QA/QC effectiveness.

RWI emphasizes the fabrication of parts exactly to the customer's specifications. To ensure that RWI accomplishes this, they have seven full-time inspectors who utilize Mitutoyo, Zeiss, and Brown & Sharp CNC-based Coordinate Measuring Machines, as well as a series of optical measuring instruments to inspect and monitor all of our products. In addition, RWI has a Voyager 12x12 Optical CMM available for non-contact, high accuracy inspection. This CMM gives RWI inspectors a state-of-the-art inspection capability, with a 0.16 micron accuracy.



**Ron Witherspoon, Inc.****The advance into micron dimensions**

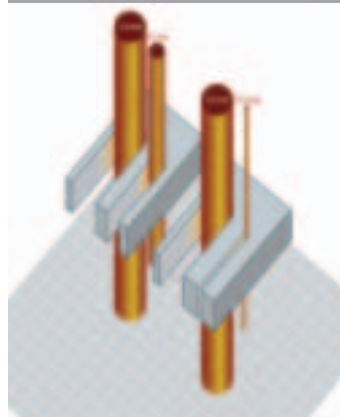
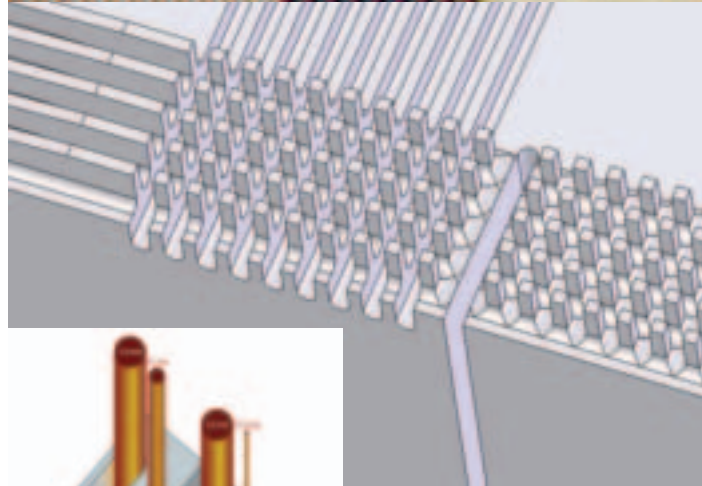
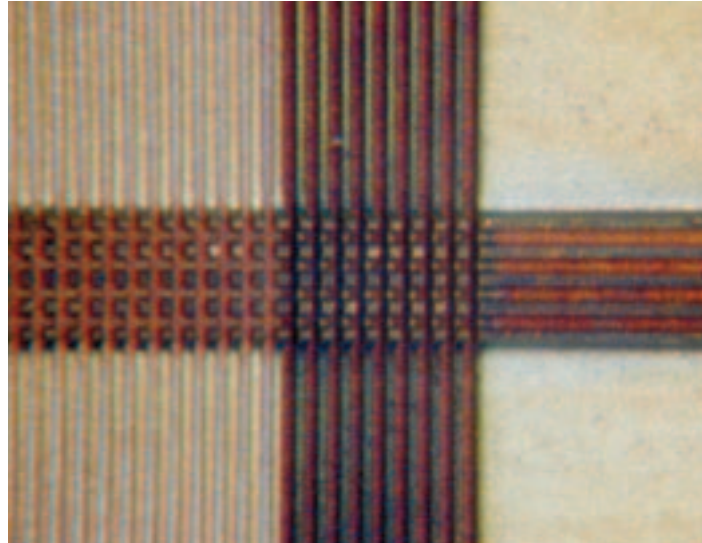
As one might expect, especially in Silicon Valley, the expectations of designers and engineers in many industries have followed the size reductions that have been achieved in much of the semiconductor industry. As a result, many projects RWI works on now involve not only tighter tolerances, but also much smaller parts. In some cases, the features on these parts can be in the 20-50 micron range!

Although RWI is one of the largest EDM shops on the West Coast of the US, the company also has significant capabilities in vertical, horizontal, and 5-axis milling, turning and mill/turn combinations, screw machining, grinding, and laser welding. Mr. Witherspoon wanted to provide a «one stop» fabrication facility for his customers. Current capabilities include turning to 0.0001" tolerance, micro-milling with endmills as small as 0.004" in diameter, and fine wire EDM using wire as small as 20 microns in diameter.

**The word impossible doesn't exist**

Mr. Witherspoon and his employees relish the challenges the company's customers give them. They like nothing better than when a new customer walks in the front door with a set of drawings and says «I've been all over the Valley, and everyone says this can't be made!»

RWI initially developed the capability to fabricate extremely small parts by modifying an Agiecut 150. RWI personnel were able to modify the feed and take-up wheels of the machine so that it would cut with 20 micron diameter tungsten wire. Although the modified Agiecut worked well, variations in the tensile strength of the wire made it difficult to



Comparison of useable wire diameters on the ED wire-cutting machine Agiecut Vertex between «normal machining» (left) and «fine-wire machining» (right).

keep the wire tight, and this limited the length of the cut the Agiecut 150 could make. Consequently, when the Agiecut Vertex came out, RWI saw an immediate opportunity and purchased one of the new machines. The company is now using the Agiecut Vertex with 0.008", 0.002" and 0.004" diameter wires to fabricate miniature parts for many customers, both old and new.

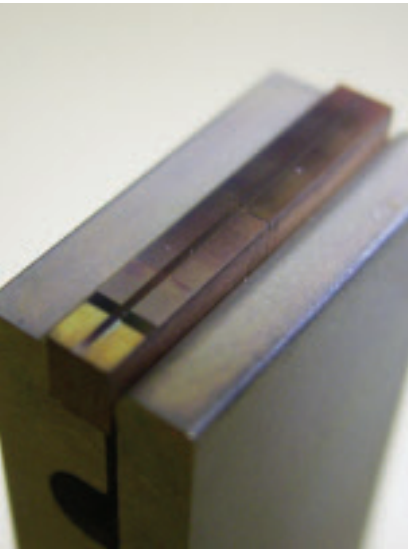
**Machining micro waves is the new challenge**

One of the most interesting projects RWI is working on currently is the development of terahertz wave structures for medical and security applications. These structures are unique, as they require both fabrication accuracies and tolerances in the several micron range. One of the structures RWI is currently manufacturing for a customer has hundreds of features that measure only 20 by 40 microns by 150 microns high, and which are sep-

arated by distances of only 30 microns. This device also has a 30 by 300 micron waveguide that passes all the way through the 2 mm thickness of the part. The part is fabricated through a combination of conventional machining (to prepare the blanks), followed by fine-wire EDM, diffusion bonding, and more fine-wire EDM.

Once these parts have been fabricated, however, there is still the matter of how to inspect them to insure they meet customer specifications. In many cases, RWI's customers do not have inspection equipment that allows them to inspect their own miniature parts, and the only way they can determine if the parts are fabricated correctly is to put them into assemblies which are then tested. The performance of these assemblies is then used to gauge the accuracy with which the parts were fabricated. This is a costly way, both in terms of time and money, to verify that parts were fabricated accurately. To help its customers with their inspection requirements and reduce the time and cost associated with verifying that the parts were fabricated accurately, RWI purchased a non-contact, optical, coordinate measuring machine with custom calibration. This custom calibration provides RWI with the capability to measure parts with a precision of 0.16 microns, thus allowing the company to easily monitor the accuracy of the miniature parts it fabricates.

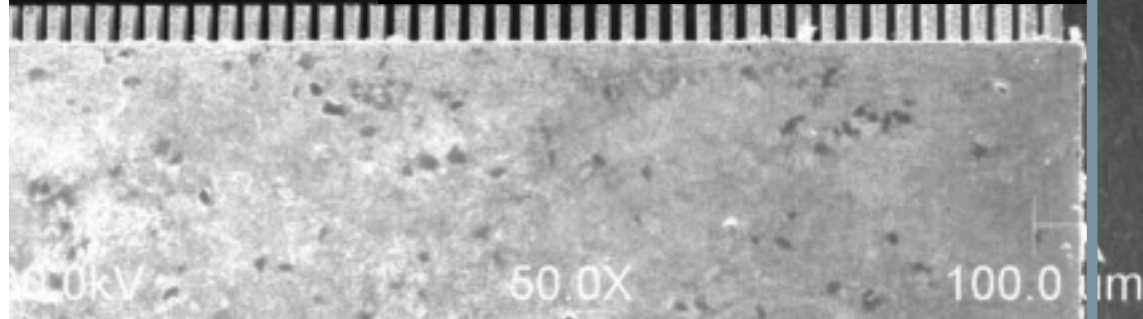
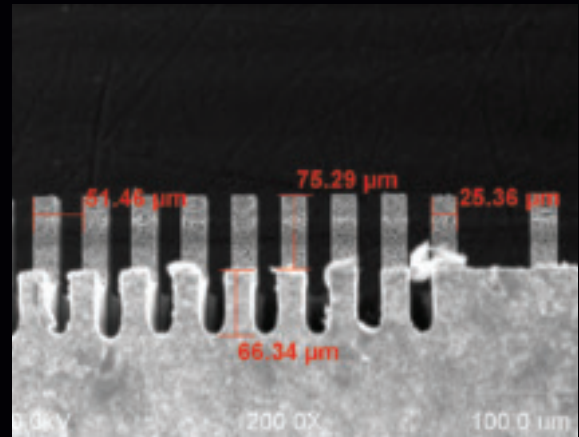
In the future, RWI expects to see more and more of its customers developing products that will require the fabrication of miniature parts. As this occurs, RWI plans to accommodate its customers by purchasing more machine tools with the capabilities for fabricating such parts, like the Agiecut Vertex.



The terahertz wave structures are machined with a Agiecut Vertex (enlargement).

The 3D drawing shows the small slots to realize with Wire EDM in micro dimensions.

The workpiece with the wire-cut terahertz wave structures needs a special fixture.



### The workpiece data

Name	Terahertz wave structures
Material	OFE copper
Cutting height	150 μm
Wire type	Tungsten 20 μm diameter

“

The Agiecut Vertex Wire EDM machine opened up for us new possibilities in the production of the smallest parts for the electronics and medical industries. The Vertex's precision and self-threading of fine wire have enabled RWI to produce structures that would have been impossible to fabricate otherwise.

Steven H. Schwartzkopf, Ph.D.,  
Administrator  
Ron Witherspoon, Inc.

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Responsible  
Sales Engineer:  
Don McMillan,  
Agie Ltd.

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**Agie Ltd.**

575 Bond Street  
Lincolnshire, Illinois 60069  
phone 800.438.5021  
www.agieus.com

**AllTech Precision Inc.**

28310 Avenue Crocker Suite E  
Valencia, California 91355  
phone 661.295.1646  
www.AllTechPrecision.com

**Anderson Global**

500 W. Sherman Blvd.  
Muskegon Heights, Michigan 49444  
phone 231.733.2164  
www.andersonglobal.com

**Die Technology, Inc.**

8820 Jefferson Highway  
Osseo, Minnesota 55369  
phone 763.424.9677  
www.dietechnology.com

**Engineering Techniques, Inc.**

3751-A Charter Park Court  
San José, California 95136  
phone 408.267.4000

**Kenmode Tool & Engineering, Inc.**

820 West Algonquin Road  
Algonquin, Illinois 60102  
phone 847.658.5041  
www.kenmode.com

**Pennco Tool & Die Inc.**

99 Mead Avenue  
Meadville, Pennsylvania 16335  
phone 814.336.5035  
www.penncotool.com

**Ron Witherspoon, Inc.**

380 Industrial Street  
Campbell, California 95008  
phone 408.370.6620  
www.rwinc.com

