ACCESSIBLE TECHNOLOGY HAS NEVER BEEN BETTER

Pat Pruitt

This presentation will illustrate advancements in a couple of different fields, some related to the jewelry industry, others not, how they can be incorporated into the jewelry industry, and how we as jewelers can use these technologies to aid us in the fabrication and production of what we currently do. In addition, it will illustrate when the advancements in a field go far enough, it drives down the price of the technology to become attainable to some studio jewelers and others. The caveat is that when the price goes down, most times, the technical support diminishes as well. Lastly, how to have fun with a variety of technologies (in general) to explore and develop new concepts, ideas, and product for the studio jeweler.

Pat Pruitt is a contemporary artist of Laguna, Chiricahua Apache and Anglo descent who is known for his cutting-edge work that uses innovative materials, design and fabrication techniques. He first learned jewelry-making by studying with Laguna jewelers Greg Lewis and Charlie Bird, who gave him a solid foundation in traditional materials like silver and copper and traditional techniques such as repoussé. In college Pruitt studied mechanical engineering and worked as a machinist, an experience that led him to open Custom Steel Body Jewelry. With his knowledge of machining technology and his love of working in stainless steel, he developed his distinctive style of stainless-steel jewelry that challenges notions of what Native American jewelry is. Pruitt's Native American heritage inspires his jewelry, but he gives every design a contemporary, industrial edge. Pruitt has received first and second place awards at Santa Fe Indian Market and Heard Museum Indian Fair & Market.

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Pat Pruitt
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INTRODUCTION

I am a metalsmith. I work exclusively with stainless steel, titanium, and zirconium. We have heard a variety of presentations ranging from the mechanical properties of alloys, foiling of gemstones, mechanical structures and micro-properties of alloys, and the ability to assay via x-rays, to the latest in additive manufacturing.... or a difference in additive manufacturing... an addition of additive manufacturing? 3D printing...yeah, that's it.

These are high tech, research-based presentations with scientific outcomes and results that will then lead to more testing, more results, more papers.

This presentation is not that. In fact, I would argue this is a mid-symposium break, a story time, something to not think about too much. Maybe it's that pause we need to digest after the magnificent lunch, or more importantly, it is the pause to acknowledge what we have at our fingertips.

This presentation doesn't have a cool PowerPoint; it is basic. This really isn't a presentation at all. What this is, is a story. A story that has been told repeatedly, throughout the ages with different people, different themes, and in different times.

One commonality you all have in this room is your specific relationship to the industry. It may be tool making, manufacturing, casting, printing, development, sales, etc. There is such a huge diversity of talent right here in this room.

As far back as the crafting of adornment goes, it has always required the skill of the hand. From the one that killed a saber tooth tiger and fashioned its tooth into a necklace, to the master goldsmith creating their masterpiece for the world to enjoy. The skill of the hand has always been supplemented by the tools and

resources one could find locally. This could have been a local blacksmith making better hammers. It could have been better clay for casting, or simply the person next door had an anvil, and you did not.

One thing most of us have in common is our power of observation. Observation is described as the action or process of observing something or someone carefully or to gain information. As you observe, you are going to gain information. How you process this information is left to your own devices.

Most of us in this room have had the pleasure to witness, firsthand, the evolution of technology on a variety of fronts over the years. We didn't realize at the time how quickly things would progress.

As an example, consider the simple act of communication with one another in real time. It is an instantaneous transfer of audio, video, and written words. Just 160 years ago, a blistering pace was set for the delivery of a letter, taking only 10 days to go from Joseph, Missouri to Sacramento, California by horseback. Only to be surpassed by the first transcontinental telegraph system sending dashes and dots, a code to communicate with those that had the knowledge.

MY OBSERVATIONS

It was around 1980-1981, when I was seven or eight years old... sitting in my friend Derek's trailer on the reservation. It was in the back room, with the brown shag carpet. And there it was, sitting on the floor with a cassette/cartridge...the Atari 2600. In my young mind, this was the coolest thing ever. The ability to play video games right in your own home. Keep in mind, on the rez we only had broadcast television, and it was channel 4 (NBC), 5 (PBS), 7 (ABC), 13 (CBS), and some odd UHF channel. It was not the plethora of stations we have instant access to today. We played that thing all summer long until one of the controllers broke. Saddened by our destructive gaming, we went outside and continued to be kids.

When the Nintendo Entertainment System hit the streets, with its awesome graphics, multi-pad controller and library of games that was growing at an exponential pace, it seemed like an eternity to our young minds. It seemed like it would never end.

Yet it did end...and something new happened. Bigger and better gaming systems came into the picture. X-Box, Sony PlayStation, both of which are now in their nth generations, with real time

multi-player in a global arena linking individuals of all ages together for those moments in time.

Why am I bringing gaming consoles into the picture? It could easily have been computers, or televisions, or cars, or any number of things that illustrate the advancement over time of the technology of a specific field. Each one has its own timeline and history and documentation of advancements. Now how does all of this apply to what we do today? Well, all of it, and none of it.

I then started a journey that has not stopped, I began to work metals.

A SHORT HISTORY

When I was 15, I had a very fortunate bike accident. It knocked out seven teeth, fractured my skull and laid me up for quite some time to heal. I made my first piece of jewelry during this time. It was a bracelet of twisted copper, under the guidance of Greg Lewis, a silversmith in my village. It was simple in nature, not too difficult to fabricate, and gave a sense of joy in fabrication. I soon started amassing tools to produce work. I believe my first anvil used to form bracelets was an old wagon axle I found and had the rough shape I needed to form. As we all know, tools start to accumulate, and accumulate they did.

I AM A TOOL JUNKIE

I took a few jewelry classes in high school, then eventually went to college for the first time. I studied mechanical engineering and landed a sweet gig with Texas Instruments in a prototype machine shop building one-of-a-kind machines.

I was surrounded by three master machinists. In this environment, there was one CNC machine, circa the late 1980s. It was a Hurco or Mazak, or some machine I never heard of, and it fascinated me. This was a form of metalsmithing I could completely relate to. This is also known as subtractive manufacturing.

Life continued and I found myself fully engaged in the body modification scene, creating jewelry for the body piercing industry, working with stainless steel and titanium. These metals I got; like, I knew them. I did this for quite a few years. It was, magically, everything I knew in the world culminating into one industry, and that was in its infancy. Little did we know this would be the start of an entire subset of jewelry that focused on implant-grade materials coupled with industrial scale manufacturing and the finishes of fine jewelry. This is where I invested in my own CNC equipment, a four-

axis machining center, a Swiss lathe, and a myriad of other tooling to round out production.

Well, that lasted for quite some time. Then when things began to fade, I moved into the current line of doing what I do today. Producing adornment for the discerning individual out of stainless steel, titanium, and zirconium. The tool set broadened; lasers came into the game.

But that is not what I am here to tell you about.

THE SHIFT

What tends to occur in any industry is the recognition of other industries and their advancements. Let's take the lathe as a great example. This is considered the mother of all machines. This one tool has the capacity to make other machines. You can build another lathe. You can build a mill. You can build a surface grinder. If you try hard enough, you can build just about anything with this one tool.

We look to this advancement in wonder and awe. Over time these tools from other industries creep into our world. A world where the scale of objects is generally small compared to other industries, and surprisingly, very rarely are there machine-specific advancements within the jewelry industry itself. Let's look at some of the presentations this weekend.

- additive manufacturing (3D printing)
- binder jet (additive manufacturing, 3D printing)
- additively manufactured 950 Palladium

All using technology not derived withing our industry, just simply applied to our industry. This is where things become interesting. For argument's sake, let's go down a few rabbit holes. This is simply my observations of technologies that have evolved extremely rapidly and have become accessible to your average studio artist to use in their applications. I'm not going into the details of the evolution of these technologies, I will identify what came into our industry from the outside and are kind of here to stay.

CNC Revolution

As this technology evolved, it quickly adapted all the manual aspects to become computer controlled. Initially three-axis, then four-, then five-, then omni-directional with head tilt and high-

speed removal rates. It really is quite scary.

Laser Systems
Who in their right mind would think, "hey, I need amplified light in my studio?" The same thing happened here, development and advancement took place completely outside the realm of jewelry. Then, someone took what was happening in industry and applied it to jewelry.

Hydraulics
Where would the studio artist be without the inclusion of hydraulic pressing? Boony Doon leads the way with this technology and its tooling.

3D Printing
1981 basic evolution, this was originally developed as a rapid prototyping technology. Fast forward to today, you can get a filament printer for under $200.

Get Ready...as the years went by, quite a few things advanced dramatically.

The computer
Without it, hardly any of this would be possible. Don't get me wrong, I'm sure there are still slide rule wizards out there. We take the computer evolution for granted, but those of you who ever worked on a Commodore 64, Apple II, or any early Windows-based machine can appreciate how far we have come. The advancements here lead to other advancements.

Software
This is such an invaluable tool these days for all of us in the design field, moving from pencil and ruler drafting to completely computer-aided drafting. Look back to the days of AutoCAD, ProEngineer and other 2D drafting suites that advanced using parametric geometry (simply put, geometry that changes based on other geometry). This quickly advanced into the virtual 3D environment. Continued development by those mentioned previously, and some new kids on the block started to make waves. Some players that evolved (and not all are noted here) would be SolidWorks, Rhino, Maya, and a plethora of other modeling suites. Each taking their own place in the world, some were for film and graphics, others for the manufacturing environment, and we had one shining star...Matrix, now called MatrixGold.

Without either of these two advancements, the third would not

be even remotely possible. The two allowed the third to become a reality. As each became more and more powerful, the ability to "print" in three dimensions became easier and easier. Part of this paper should go into the history and how vibrantly it evolved, but I will skip to today.

We acknowledge these advancements were never intended for our (jewelers') use, yet someone among us saw the application fit the needs of this industry, a that's when it became ours.

OBSERVATIONS

Initial Tech

Initially the technology, whatever that tech is, is normally kept close to the makers' or inventors' circle, typically done by patents, trade secrets, etc. The originator generally develops the technology to a point where it becomes marketable. From there, the tech ends up in the hands of those that can afford the latest and greatest. It muddles around there for quite some time, usually until whatever protections expire, then it gets sent out into the masses.

Communal Support

When the mass production of the tech hits the streets, a ton of people want to get in on this, purely because of what the tech will do, and because it has become inexpensive. A few of these individuals generally have connections to those that have been using the technology for a while and often help them with the new equipment. There is also a large group of individuals that, through the interwebs, seek out one another to then start to troubleshoot and become a worldwide resource. Language barriers are often challenging, and at the end of the day, it becomes a collective resource for technology.

From Industrial to Not-So-Industrial

Let's take a pause here, we have covered a ton of information, from evolution, to development, to cross pollination. Now what's next? This is an interesting subject matter, mostly because it is such a polarizing topic.

AI

Show of hands, who's familiar with AI currently? Artificial intelligence, this past year, has really come to the forefront of the masses. It has taken a firm foothold within certain communities. The creative types love it and absolute detest it.

Polarizing
Where this becomes interesting, I've spoken about this at Bowling Green State university (Go Falcons!) in Ohio. I've participated in a project with Wolf Gordon, an international wall-covering company comparing HI (Human Intelligence) against AI with design prompting for developing wallpaper.

I'll repeat what I said earlier, I am no expert, but the basis here is to take a bunch of words, prompts in the AI field, string them together, and you get a two-dimensional representation of what you just described. This could be a pair of jewel-encrusted 24K gold glasses in the shape of flamingos. Now, one of two things could happen:

- you get exactly what you thought: a pair of 24K gold jewel encrusted glasses (eyewear) shaped like flamingos

or

- you get a pair of 24K gold jewel encrusted glasses (drinkware) shaped like flamingos

If that's not what you described, you modify that prompt, or clarify it, or move it within the string. It's totally dependent on you. The tech simply does what you tell it, and honestly it's quite amazing that it uses its collective to create these images and we simply have to describe it in a language it can recognize.

Now, this is where it truly blows my mind. We talked about our environment, this three-dimensional space in which we can design, construct, verify, deconstruct, stratify, output, laminate and recreate this design into a physical form for the world to love. We have established that we have an environment in which our hands play a major role. Now imagine having a tool in which you can do this with words, in which you can describe exactly what you want, and in a moment, a three-dimensional representation is created.

A 3D AI Engine! Now THAT is magic.

We have the computers.
We have the software.
We have the hardware.
We have the processes.
It really is only a matter of time before this becomes an attainable resource for artists. And this, my friends, is why it is an exciting time and the access to technology has never been better.

ADDENDUM

An interesting observation...look around.

An interesting thing about the use of what gets talked about and discussed here is following through with how that technology is used. Segue back into my story here for a bit. At the Santa Fe Symposium® quite a few years ago, a discussion was had about coloring titanium with the laser. I do not remember who gave the presentation. I do remember how awestruck I was at the time, thinking to myself, man, if I only had a bazillion-dollar laser in my studio. Well, it didn't cost me a bazillion dollars, but it wasn't cheap either.

That SFS presentation sparked something in me, something creative, something magical. It would be an interesting observation to see how all of this can be applied in a studio setting. To see studio artists embrace the technology at this level, bring them into the fold, and give them the opportunity to express their translation, would be quite amazing.

ACKNOWLEDGEMENTS

Thank you, to all the sponsors, speakers, and attendees. It is truly nice to see the continuation of the passing and sharing of knowledge. That is what will set the tone. A special thanks to Eddie Bell, the world's most interesting man, for all the hard work he has done over the years. Hats off to Linus and the entire team for continuing the symposium tradition.