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THE COOL POD

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Pg. 17



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IN THIS ISSUE:

ARCHITECTURE, ENGINEERING, & CONSTRUCTION

pg. 3

VIZLab

When leading architecture and engineering firm PBK needed state-of-the-art rendering or their new visualization lab, they chose BOXX

4

NEW HARDWARE

BOXX adds AMD Ryzen processors and a new workstation to our lineup of professional workstations

8

On Site & On Target

With BIM on the rebound, Phil Simon of SB Ballard swears by his GoBOXX mobile workstation

9

MANUFACTURING & PRODUCT DESIGN

pg. 16

FEATURE STORY

The Cool Pod

Sponsored by BOXX, The University of Wisconsin BadgerLoop pod is competing in Elon Musk's SpaceX Hyperloop competition...and attempting to change the world of transportation

17

Welcome Back Choppers

Orange County Choppers senior designer Jason Pohl and media & marketing advisor Jim Kerr cut up and cut loose on the business

23

Rocket Ship

BOXX solutions saved Accelerated Machine Design & Engineering \$20-\$50,000 a year, enabling the firm to put items "in space, in the ground, and in humans."

34

MEDIA AND ENTERTAINMENT

pg. 38

My Active Studio

Boutique design, VFX, and animation studio My Active Driveway goes big with BOXX, creating national commercials for high profile clients

39

Smaller. Lighter. Faster. Quieter.

Thanks to department chair Marty Fitzgerald, East Tennessee State University's animation program runs on BOXX

45

The Animator

With BIM on the rebound, Phil Simon of SB Ballard swears by his GoBOXX mobile workstation

49

BOXX Goes Deep

With our recent acquisition of Cirrascale Cloud Services, BOXX is ready to take deep learning and artificial intelligence to new heights...and depths

54



pg. 4



pg. 9



pg. 17



pg. 23



pg. 39



pg. 49

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ARCHITECTURE, ENGINEERING, AND CONSTRUCTION

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For over 19 years, we have earned a reputation as the leading innovator of reliable, high performance solutions that enhance creativity and increase productivity — resulting in increased profits and efficient workflows for our customers.

BOXX Customers





BOXX CUSTOMER
STORY
BY: JOHN VONDRAK

VIZLAB

When leading architecture and engineering firm PBK needed state-of-the-art rendering for their new visualization lab, they chose BOXX

Jose Galindo is the Director of the PBK Visualization Lab (or VIZLab as he likes to refer to it), a San Antonio-based illustration and animation group within PBK Architects, a national architecture and engineering solutions leader focused on K-12 school, higher education, healthcare, corporate, and government clients. “The firm has been providing professional planning and design services for more than 34 years and has established a strong reputation for its unique approach to performance-based design and responsive customer service,” says Galindo. “We effectively facilitate a collaborative, consensus-generating design process that produces customized, purpose-specific, building environments which enhance end-user performance. We also maintain strict control of the client’s budget and schedule objectives.” PBK has offices in Houston, Dallas, Fort Worth, San Antonio, Austin, and McAllen.

In 2014, when PBK CEO Dan Boggio announced the creation of the VIZLab as an independent group within the firm, it was understood that the new division would be tasked with specific goals, chief among them, providing clients with dynamic, real-time, life-like, project visualizations prior to the start of construction. At its inception, the VIZLab primarily assisted PBK’s Higher Education division (also based in the San Antonio office), but it wasn’t long before that changed. “Now that the group has grown in its capabilities,” says Galindo, “we’re taking on projects sourced from the entire firm. Also, the VIZLab has the capability to work with outside clients on a variety of project types ranging from renderings to augmented reality presentations to mobile application development.”

Galindo has worked in the A/E industry since 2005. Prior to PBK, he owned a small San Antonio illustration firm and had a stint at Jacobs Engi-



neering, the Fortune 500 international technical professional services firm. The other VIZLab team member, visualization specialist Oscar Veloz, is an architecture school graduate of the University of Texas at San Antonio. Veloz began his PBK career as an intern in January of 2014, but transitioned to the VIZLab later that year.

Together, Galindo and Veloz have built the VIZLab from the ground up, helping PBK develop stunning new visuals and client presentations.

THE CREATIVE PROCESS

In most cases, when the PBK VIZLab receives a request from one of their offices, they ask the project team to send either a SketchUp or Revit model, along with any related drawings, such as site plans and material boards. After reviewing all the materials, the VIZLab crew gets down to business. “We have a kickoff discussion to determine how our illustrations will be used so we can tailor the look and feel of the imagery to best fit the presentation,” says Galindo. “PBK typically has established, long-standing relationships with its clients, and I find that our more senior staff often have intimate knowledge of what specific clients like and dislike.”

As an example, Galindo cites a recent VIZLab animation developed from a request that the client presentation play within a high school yearbook (see accompanying video). The sequence, which bookends the presentation, was created in Adobe After Effects and features images of the school and its alums amid turning yearbook pages. It begins when the existing school was built and travels through the ensuing years, leading to the present day and the unveiling of the new school design. It’s an ingenious concept, but Galindo and Veloz weren’t finished yet. The team went one step further when, at the suggestion of the project manager, their visuals were accompanied by a popular song—one the PM knew would surely inspire the client. Galindo admits that this type of presentation is a bit uncommon. In more typical situations, where a pre-determined creative direction doesn’t exist, the VIZLab works with the project team’s point of contact to create storyboards and establish a sketched out direction for the project. “Once we have worked through a storyboard and feel happy with our creative direction,” says Galindo, “we jump into Autodesk 3ds Max and begin modeling, texturing, and lighting our projects.”



WORKFLOW

Dependant on what group sends them a project, the VIZLab workflow begins with either a Autodesk Revit model or a model out of SketchUp. If it comes from Revit, Veloz usually cleans up the model as needed and then links to it from 3ds Max. “We thoroughly enjoy working from Revit,” says Galindo, “because it makes it easy for us to apply changes to the model that came from the project teams. When we get a SketchUp model, we usually remodel the project in 3ds Max and use the SketchUp model as a reference. We spend most of our time in 3ds Max and rendering with Vray 3.0, but we also rely heavily on Adobe Photoshop, After Effects, and Premiere Pro. When we have elaborate environments, we’ll use eon Vue because it can create intricate landscapes and environments quickly. In situations where we have tighter deadlines for animations, we use Lumion because it integrates with SketchUp and Revit well and renders very quickly on the GPU.” The VIZ Lab manages the render farm load with Pipeline FX Qube! render management software and at present, is working with Pipeline FX to develop a new job type for SketchUp so they will be able to distribute render jobs from SketchUp through the Qube! interface.

RENDERING DILEMMA

Although the whole rendering process sounds ordered and efficient now, Galindo says that wasn’t always the case. In fact, when he first arrived at PBK, it didn’t take long for him to see that the rendering process left much to be desired. “All we had were standard Dell 3600 machines and a render farm made up of various unutilized computers,” he recalls. “In the beginning, I would spend more time trying to get the farm running and stay running than I would actually working on projects.” Realizing that they couldn’t execute projects efficiently and wanting more from final product, Galindo spoke with Boggio about starting the VIZLab. Fortunately, the wise CEO quickly agreed that an illustration group in PBK would be a valuable asset to the firm’s workflow. Given the ‘go ahead,’ on creating the VIZLab, Galindo set about establishing a proper render farm.

CALLING BOXX

He already knew his next move. While employed at Jacobs Engineering, Galindo had watched a render farm demonstration presented by BOXX



Technologies. Needless to say, it left an impact. “At the time, we were substantially building up our rendering capabilities in our San Antonio office,” he recalls, “and I was very impressed with the demo that BOXX gave us.” Over the past few years, Galindo also enjoyed occasional opportunities to use a high performance BOXX workstation. “When it came time to purchase a render farm for the VIZLab,” he says, “my first thought was to approach BOXX.” When Galindo contacted the Austin, Texas-based hardware manufacturer, the voice on the other end of the line was BOXX performance specialist Rich Petit. “The entire experience was awesome, Galindo recalls. “Rich was very knowledgeable and always quick to respond to my questions and concerns. He was very sensitive to my needs and budget, and I never felt like he was trying to sell me more than what I needed.”



TURN KEY SOLUTION

What PBK needed was a RenderFarm On Wheels (ROW), the ultimate turn-key render farm, available in a wide range of sizes and expandable to over 80 modules (2880 cores). The complete hardware package included rack-mounted, dual CPU render nodes held in a mobile enclosure. When the ROW arrived, Galindo was surprised that it fit into two boxes and delighted that it only took an hour or so to assemble. The real excitement, however, began when he put it to work. “Once I had all our software installed,” he says, “I was amazed that I could now render, in a matter of minutes, projects that previously took hours upon hours to complete. Since that point, we haven’t had any down time on the farm; it simply works. The ROW allows our small group to output work at a rate that would have never been possible if we were using our previous impromptu farm.” An added bonus is that Galindo no longer spends hours maintaining a render farm. “The new tech-

nology has allowed our team to spend more time executing our projects, rather than stopping work earlier than necessary to render,” he says. “In addition, having the ROW allows us to iterate many changes without worrying about render times getting in the way of our deadlines. It’s amazingly effective to be able to render multiple jobs and thousands of frames at nights and on weekends, and know that in the morning, our jobs will be finished and we can spend our day working.” As for legendary BOXX Technical Support, Galindo has only needed to contact them once, and like the rest of the BOXX experience, it went as expected. “They were extremely quick to respond and solve our problem,” he says.

EXPANDING THE FARM

At present, PBK uses built workstations, but as the group continues to grow (and after seeing how their RenderFarm on Wheels performs), Galindo believes he will likely be making a transition over to BOXX workstations in the future. “If the performance and reliability of our ROW is any indicator, BOXX workstations should perform on par with our built machines while being more reliable,” he says. Galindo would also like to expand the render farm. “I see our workflow transitioning into a heavier GPU-compute workflow and away from pure CPU rendering. As a result, BOXX solutions make even more sense over competing solutions. I know that I can go to BOXX and get a four GPU workstation custom-tailored to my workflow. As far as I know, similar custom configurations are not offered by the competition without a significantly higher price tag.” ■



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When someone mentions BOXX workstations, you naturally think of professional overclocking, liquid-cooling, multi-GPUs, and other key features that have come to define BOXX innovation. In fact, “innovative integration” has long been a part of our vernacular, just like our partnerships with Microsoft, NVIDIA, Intel, and other leading technology providers.

One of those “other leading technology providers” is AMD. When reviewing our company history, some may have overlooked or even forgotten our long and storied partnership with the semiconductor giant, but fortunately for BOXX, we haven’t.

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Highly configurable APEXX 4 series workstations provide outstanding support for multi-threaded applications like Autodesk® 3ds Max®, Maya, Adobe CC, DaVinci Resolve, Cinema 4D, and V-Ray.



APEXX S3: All Aboard the New Flagship

APEXX 2 2403. We called it our flagship, our best-seller, and the most popular BOXX ever. As for engineers, architects, and other 3D content creators, they called it amazing, incredible, and the system that changed their workflow forever. (Accelerating 3D CAD and design applications to new heights will do that for you). So where do we go from here? How about better, faster, with a redesigned chassis and brand new name to go with it.

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Inside a new, ultra-compact, industrial chassis, the computationally dense APEXX S3 houses up to two, full-length NVIDIA® or AMD® Radeon Pro™ professional graphics cards, solid state drives, and faster memory at 2600MHz DDR4. As an added bonus, we removed unused, outdated tech (like optical drive bays) in order to maximize space.

So whether you rely on Dassault Systèmes SOLIDWORKS®, Autodesk® Revit, 3ds Max and Maya, or Cinema 4D and other applications, APEXX S3 is the new BOXX flagship for you.

Welcome aboard.



ON SITE & ON TARGET

With BIM on the rebound, Phil Simon of SB Ballard swears by his GoBOXX mobile workstation

“You know what would really be useful is a BOXX notebook, something like an iPad, but interoperable with Autodesk, displaying models and working with 360. It would obviously have less capability, but to do what a field machine does as well as this laptop does. . .that would be something,” says Phil Simon, as he muses on the ideal “field portable machine.” For the time being, however, he’ll have to settle for that “laptop” he refers to (and greatly admires), his GoBOXX 2725 mobile workstation. Philip K. Simon is the virtual construction manager for SB Ballard, the Virginia-based construction company that provides pre-construction services, general contracting, construction management, design build and concrete contracting services to an impressive list of clients throughout the mid-Atlantic and southeastern United States. From healthcare, government, and education industries to arts, entertainment and sports, SB Ballard has grown to become one of the largest general contractors in Virginia.

A veteran of the United States Army, Simon served as a plans officer, diagramming planning, coordinating relations, and the like. Upon his honorable discharge, Simon labored in the trades as a carpenter, heavy equipment operator, and pipe layer, steadily working his way through the ranks until he became the chief operating officer for a Colorado civil construction company focused on land development. When he relocated to Virginia, he began his career with SB Ballard first as a quality control manager, then as a project manager. After awhile though, he requested a move to project controls, which evolved into BIM. “I don’t really see sched-



BOXX CUSTOMER
STORY

BY: JOHN VONDRAK

uling and other controls as anything different,” he says. “They’re all part of the same process.”

Twenty-five years ago, Simon took college courses at night “just to keep myself entertained,” he says, and when he saw Autodesk AutoCAD in the university bookstore for only \$200, he bought it and taught himself to use it. He’s been using AutoCAD ever since—first as a junior estimator for a subcontractor where he was required to do shop drawings for all projects. In civil construction and land development, he also used LDD (Land Development Desktop) a great deal, as well as AGTEK. So upon his arrival at SB Ballard, Simon already possessed the basics of 3D modeling. “I just didn’t know Revit,” he admits. “But this is a very technology forward company with all the tools, so I took some classes on it and learned. And being interested in project coordination, BIM was a natural for me.”

THE APPLICATIONS

Simon is unabashed in his love of Autodesk Revit, using it for all of his architectural modeling. “There are lots of things we can do with Revit,” he says. “We do many of them, but like every contractor, we have these tools, but don’t always have the time or manpower to use them in every way they can be used.” Simon also relies on Autodesk 3ds Max for visualization animation. “When we do the marketing models, we usually create animations to show some of the viewpoints,” he says. “We’ll present the owner with walk-throughs so they can see things from different points of view, how things flow. We’ll demonstrate what they can do to improve lighting or day lighting for LEED certification. 3ds Max is really useful for daylight studies and a lot of interior lighting studies as well. You may think of it as software for making cartoons, but it has a very powerful lighting package. Using photometric lighting, we can get very good ideas of how rooms are actually going to look.”

In addition to Revit and 3ds Max, Simon relies on the entire Autodesk and Adobe CS suites. In Adobe, it’s primarily Photoshop, Lightroom, and Premiere Pro for post processing and when a polished, overall movie-level look is desired. Animations are created in 3ds Max or Autodesk Navisworks, rendered out, sound is added, and the entire piece is cut together with captioning included. “Premiere is really flexible and you can lay down as many tracks as you’d like,” says Simon. Animation also comes into play when the team works on their proposed schedule. They use Autodesk Navisworks to create timeline animations. “We do that in the field as well,” says Simon. “With our monthly updates, we actualize the Navisworks Timeliner so that we can compare our baseline schedule work with the actual project and then learn what we’re doing right or wrong.”

THE PROCESS

“I start in Revit,” says Simon. “It’s the tool I know.” SB Ballard’s most common delivery method is “CM at risk” where they work very early with the architects and engineers who are still under contract with the owner and not with SB Ballard. Usually, SB Ballard gets involved at the schematic stage so the program requirements are already designed into the building. However, there are a lot of specifics that aren’t completed like structural work and other specifications, so the construction company begins with a value engineering constructability review which improves the way the building is designed, therefore making it easier to build.

“In value engineering, we’re obviously looking for things we can remove from the building to save money in the budget without impacting the functionality of the program requirements,” says Simon. “The architect will give us a model and at that point, our big interest is using the model to develop a schedule and to look at the details that we’re going to need.” Simon and his team work directly out of Revit and in their constructability review, the project estimators and in-house consultants receive PDF and hard copy plans. Based on their particular areas of expertise, they provide comments which are then assembled by a coordinator. A series of collaborative constructability workshops (including the architect and owner) follow. Over the course of a few days and using the model, all comments are considered. “We’ll sketch things up in the model that we think will make good details and make the project more feasible,” says Simon.

Discussing the collaborative progress of a project, Simon points to a recent convocation center where the steel subcontractor was extremely critical to the design process, so he was brought on board as soon as possible. The subcontractor’s early steel



model was created in Tekla, so Simon converted that into Revit and has been working with that in coordination ever since. “It was very critical that we had that model and got him involved early because once we get the contract for construction, we buy it out, get all of subcontractors on board, and write into our contract that they will provide us with an IFC compliant model management of any required shop regulations. From that point on, piece-by-piece, we strip out those things that the architects and engineers have given us and replace them with the subcontractor-provided shop drawings. Then we’re looking at actual coordination. If there is a VAV or an air handler, we know what brand, exactly what size, and exactly where the connections are. We’re looking for those mating surfaces and that spatial coordination. By the time we’re in construction, we have a model that is completely customized to what the subcontractors are going to provide.”

Following this, the model is converted to Navisworks, becoming the “as built model,” i.e., what SB Ballard provides to the owner at the end of the project for facilities management. It includes all RFIs and has all aspects tagged so the owner will know exactly what it is. “We’ll link it,” says Simon, “so they can click on something and it will pop up a spreadsheet that will show them what filter it needs, what light bulb it needs, who to call for maintenance.” At this point, the model is then pushed out to the field. SB Ballard requires all subcontract superintendents with coordination issues (steel and mechanical, for example) to carry iPads and use Autodesk BIM 360 Glue, the cloud-based BIM management and collaboration tool, so they don’t have to carry sheaves of paper around while performing their checks. “It’s great for substrate,” says Simon. “If you’re going to hang ductwork, the electrician has already been through. You want to know if he’s taken up any of your space and you can see that right away just by

walking down that hallway with your iPad and 360 glue—incredible technology.”

Another portion of Simon’s time is devoted to marketing, where he provides customer presentations. “Most of the jobs we do are construction at risk or design build,” says Simon, “so we want to show the owner that we can visualize, as well as help them visualize and coordinate with what they want to build.” In nearly every bid, this involves the construction of a three-dimensional project model which also helps Simon and his team better understand the project when it is presented to the estimators.

WORKFLOW CHALLENGES

“In the pre construction workflow,” says Simon, “the challenge is interoperability. You have architects that use ArchiCAD and architects using CAD are a problem.” Simon bemoans the fact that IFC models do not “transfer necessarily as advertised” into Revit which results in a substantial loss of information. “I think there’s still a lot of work to be done from the IFC side and I’m not sure whether these are software manufacturer problems or whether these are IFC standards problems,” says Simon. “I think it’s a little bit of both.” Another challenge Simon and his team face occurs during the construction phase when subcontractors are slow to review the models and provide input. Another is when, out in the field, an old fashioned superintendent objects to using BIM and Simon must insist that they do. “I’m pretty rigid about it,” he chuckles, “but it saves everybody a lot of time and money if you can get them all on board. Getting buy-in is key and it really helps if the owner is into BIM. If an owner is aware of the BIM process and really wants to see it used, that makes all the difference in the world.”

Based on experience, Simon believes that the per-



centage of owners insisting on BIM is about fifty percent. “Some care very deeply while others think it’s a waste of time,” he says. According to Simon, there is also a fair amount that remain indifferent. Among subcontractors, Simon believes that it depends on the size of the company. Large subs are always on board, while for smaller outfits, there remains a financial barrier to entry. Simon points to the cost of his GoBOXX, professional desktop workstations, and the necessary software applications as proof. “You can get away with less especially if you’re only using Navisworks,” he says, “but as a GC, if you really want to get in the door, it’s going to cost you some money and some dedicated people. If you don’t have the workload to justify it, it can be difficult to find consultants who are good at BIM. We tried very hard and we have one or two consultants we go to for certain projects, but most of them are either incredibly expensive or they are on a steeper learning curve than we are. That’s a challenge. A small general contractor is going to have difficulty finding someone to provide service because there just aren’t that many of them out there.”



WE’RE GOING WITH BOXX

Prior to his GoBOXX mobile workstation, Simon relied on a top-of-the-line Dell laptop primarily because at that time, he simply wasn’t aware of BOXX. “Dell was extremely well-rated with an aluminum

case, good speed, and power for graphics,” he recalls, “but it was nothing like this GoBOXX.” Simon discovered BOXX during a trip to Autodesk University in 2012 where he actually shuffled his Dell laptop around, looking for a comparable model. “I had just got it, so it was still brand new,” he recalls. “We didn’t know too much about the available machines. Lenovo was there, HP too, and I asked them all, ‘What do you have that compares to this machine?’ They all said nothing. They didn’t have anything like it. So I went to the BOXX booth and their reply was ‘What do you need?’ We made the resolution then that when it was time to get another machine, we were going with BOXX.”

When discussing the speed and performance of his mobile workstation, Simon mentions the Intel processor and ten cores, but is also quick to credit the machine’s cooling ability. “It has four good size fans underneath it, so it doesn’t get hot. If you put my old Dell machine in your lap, you’d get blisters,” he says with a laugh. “I had to keep a chill pad under it. Other machines tend to bog down when they get hot, but this GoBOXX doesn’t and that’s the big difference—failure rate. I think the ability to run cool makes a big difference in the life of the machine. Our IT guys check the logs of when things break down and my other machines have always broken down because of heat.” When I ask Simon if machine failure ever occurred during a presentation, he replies, “Yes—especially during animation when you’re processing a lot of graphics. Animation is where it really makes a difference. That’s where that heat will get you. I think the combination of a lot of processing power, which makes it very fast, also generates a lot of heat.”

You can’t mention 3D applications these days without discussing rendering, so I ask Simon about rendering on the GoBOXX. He replies that heavy rendering with 3ds Max is offloaded to a renderPRO, the BOXX personal, desktside rendering module. “We only do that with 3ds Max, so I work in it ten percent of the time. These are typically animations where I’m rendering thousands of images—six images a second in a four to five minute animation. That gets to be a large rendering project. If I have something I need to do quick and dirty and don’t have time to get it into 3ds Max, clean it up, get the lighting right, and all that, I can still do renderings out of Revit on the GoBOXX and clean them up in Adobe Photoshop pretty quickly.” He adds that SB Ballard does very little rendering in Revit, but insists that his GoBOXX is significantly faster (twice as fast, in fact) as any other machine he’s ever used. As for calculating rendering times on the GoBOXX, Simon acknowledges that there is no average—it simply depends on the detail of the model. “Yesterday I did an exterior stairway with a water feature next to it,” he says. “Not an incredibly complicated model and I did it at a high resolution. It took four minutes to render. Best quality took twelve minutes. It was very fast. Doing a



DEWATER COMMUNITY COLLEGE
THOMAS W. MOSS CAMPUS

big model rendering with custom lighting and 3ds Max, you have a lot less control over what is rendered in Revit, so you can't turn things on and off. You pretty much have to render the whole model. It was intense— probably took twenty-five to thirty minutes. It would have taken several hours on the old machine. If the GoBOXX is not four times as fast, it's at least twice as fast. Waiting twenty to thirty minutes for a rendering like that is nothing."

When I ask Simon to explain the most substantial differences between the GoBOXX and his previous mobile, he pauses for a moment. "When you're actually navigating around the machine, the differences are subtle, but significant. The action on orbiting and panning is smoother so that you're less likely to catch and select the wrong thing—and that can be very irritating when you're modeling. If a machine is lagging just a little bit behind, you'll select and then you'll find you actually selected the last thing that you thought you were hovering over. I can't estimate how much time it saves you because of that. What I can say is that this thing "light screens" a lot less. Revit used to crash on me several times a day on the Dell, but I have very few crashes now. Since I've had this machine, I've only had two Revit crashes which is incredible."

As for being a solution to previous workflow problems, Simon also cites the machine's easy and uncanny compatibility with AV projection systems. According to him, this third aspect is critical since he is often required to present a model on a moment's notice. "Having a very fast, portable machine is extremely important in that regard," he says. "Working at my desk I used to hate it when someone said 'Can you come to the conference room and show us the model?' My answer was always, 'I may be able to. Let me see if I can get this thing fired up. Not anymore."

In our field offices we have large screen televisions and projection screens for presentation meetings, so I have to be able to link in and get hooked up on that particular system." As the only laptop he uses, Simon spends about twenty percent of his time out of the office. At least one day a week he's either in the conference room presenting something to someone, or at a client presentation, or out in the field running some type of meeting where he must show the model on the screen.

NICE TO DO STUFF

Although he's not privy to any actual benchmarking data, Simon insists that in terms of produc-

tivity, he's getting a lot more "nice to do stuff" accomplished. He defines "nice to do" as either detailing in models or finishing. "You're never really done with a model," he laughs. "You simply run out of time and have to go with it. With the GoBOXX, my models are more detailed and more corrected. I have more time to go back and fix things." He also says that he has more time to grant the constant requests ("Could you sketch this up for me please?") that come his way.

When discussing GoBOXX performance, Simon relays a story about a recent SB Ballard project where they faced some challenges obtaining IFC models from the ductwork and sprinkler system subcontractors. "Their shot drawings were on paper," says Simon, "and with the GoBOXX, it was easy to model those things. With the Dell laptop, it would have been very difficult because the model was extremely large, very specific." Simon points out that SB Ballard will actually model detail items that architects don't. As an example, he refers to glass connections where they (SB Ballard) actually build a 3D model of the connection. "Architects won't do that because they're trying to show design intent—not specifications," says Simon. "We want to look at the specific part and make sure it will fit." Simon adds that often, the mechanical contractor has previously chosen equipment from a manufacturer that doesn't have Revit models, therefore requiring SB Ballard to create them. In these instances, his Dell laptop would quickly bog down under the weight of such large scale models, while his GoBOXX handles them with ease.

"WHEN YOU'RE TRYING TO GET THE JOB, IT'S VERY CUTTHROAT"

Because SB Ballard has earned a reputation as a builder of large scale, high profile projects, Simon's project presentations come with a certain degree of expectation. "In some ways, I think we sort of built a trap for ourselves," he admits. "If we don't walk in with all the bells and whistles, then the client thinks we're giving him short shrift and that we don't really want the job. The level of expectation has definitely increased. Where Timelander video was once sufficient, we now have to have a lot more. We used to go in with simple power point presentations of pdf slides. That just doesn't work anymore. It must be very highly orchestrated. In the bidding process when you're trying to get the job, it's very cutthroat. All those contractors out there have the capability to CM at risk or design build work, and they're competing for these jobs. The majority of contractors

are going after these hard bid jobs and we can't differentiate ourselves in those because it's all about price. Ideally, we need to have a best value environment where we can demonstrate to the owner what we can do and let them know that they're going to get a better product and then they'll want to use us again. That's not something we can communicate in a hard bid. Most quality general contractors are in that quandary."

As for the future of BIM, Simon believes it's firmly on the way back following a period where it seemed to be in somewhat of a decline. He refers to a competitor, a "quality general contractor" that at one time employed a BIM staff of eight, went through layoffs, and is down to one. "A few years ago, BIM's stock was way down," he admits, "but now it's coming back. Owners demand it and it saves money."

Because of all the information it provides in terms of long term maintenance, I compare BIM to "service after the sale," and Simon agrees. "When we give it to most owners, they ask, 'Do we really need this?'" he says. "But some demand it. In another two years, they'll all want it and institutional owners are going to want to tie it into the facilities management systems they're buying. That's sort of the next thing we're looking at—going to the 6D lifecycle integrating with facilities management. We just don't have many owners that are terribly interested in that right now, but they're starting to come around and we're ready for them. The biggest factor for us, in order to produce a facilities management solution, is what facilities management software they're going to use. It's still sort of an emerging thing so the standards aren't as strong as they should be.

As our conversation winds down, I ask Phil Simon if SB Ballard considers BOXX a part of their future and he quickly replies that they already need more and as their current machines reach their expiration date, will likely purchase additional GoBOXX systems. "I asked IT for a GoBOXX 2720 and they got me (a top of the line) 2725 because they wanted to give it a try," says Simon. "I'm glad they did. It's a great machine. The performance is absolutely jaw-dropping and I couldn't be happier with it." ■

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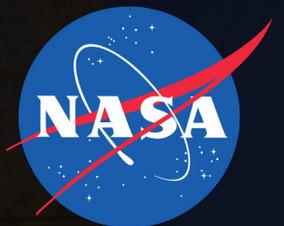
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THE COOL POD



BOXX CUSTOMER
STORY

BY: JOHN VONDRAK

Sponsored by BOXX, The University of Wisconsin BadgerLoop pod is competing in Elon Musk's SpaceX Hyperloop competition...and attempting to change the world of transportation.

Since its proposal by SpaceX CEO/CTO Elon Musk in 2013, Hyperloop technology has evolved beyond a futuristic concept into a near-future, new world standard for high-speed transportation efficiency. Hyperloop design consists of a levitating pod traveling at nearly 760 miles per hour through an evacuated steel tube where low pressure minimizes drag forces and contact-less magnetic levitation further diminishes energy loss. As one of thirty international design teams chosen for the Hyperloop Pod Competition, the University of Wisconsin BadgerLoop team includes both STEM and business majors, as well as accomplished academic and industry advisors.

During the final competition weekend, the team presents and tests a scaled prototype at a mile-long test track with the primary goal of producing a fail-safe, passenger-friendly, scalable prototype that successfully levitates throughout the length of the track. Throughout the design process, BOXX APEXX workstations have been instrumental to the team's workflow. Their systems consist of an eight-core APEXX 4 7402 and a four-core APEXX 2 2401. Both systems feature liquid-cooled, overclocked Intel® Core™ i7 processors and NVIDIA® Quadro® graphics, making them ideal for single-threaded engineering applications.

I recently spoke with a pair of UW undergrads, Technical Director Max Henry and Structural Analysis Team Lead Justin Williams, just two of the one hundred brilliant young minds behind BadgerLoop.



Tell me a little about yourself and your role in BadgerLoop.

Justin: I'm a junior majoring in engineering physics, which is kind of an experimental degree, so I study scientific computing. I first heard about BadgerLoop in the summer of 2015. An email was sent to the entire college of engineering asking for people who were interested in this and it reminded me of the project I read about in 2013 when Elon Musk first published his paper. I was so amazed that this was a competition that was actually going to happen! I had been asked to do something that most engineers don't get a chance to do—to build something like this, something that could actually change transportation. I just thought it was a great opportunity. I began learning as much as I could because no one teaches you how to build high speed pods in classes. I had to learn how to do it, what challenges would be involved, and figure out what I could contribute and what I could improve.

My main role on the team is to go through our entire design and ensure that it won't fail when we go to the competition in California. I also maintain standards on safety, etc. On a typical day, I finish with all my classwork, then I go into our computer lab area and just start working on simulating everything there is to simulate. That involves using ANSYS and doing repetitions and simulations so we find the right result. I also help make sure our design is safe.

Max: I'm a sophomore, and as tech director, I do system integration on the mechanical side of things. We do a lot of CAD for our design—very compute heavy.

What are the typical steps involved with this project?

Max: We do all of our design on the computer, so within that design, we go from design to simulation. That's when we do all of our geometric modeling—using CAD and SOLIDWORKS. After the design parameters are set, we use other computer simulation packages and that's where we do a lot of our finite element analysis and computational fluid dynamics. It's also where we validate whether or not our design is going to work. We determine our specs, so if we go with a design that looks like this, how strong is it going to be? We can also run our finite element analysis with ANSYS. We plug in the loading scenario and we can see how strong it's going to be and where the weak points would be if it would happen to fail in a higher loading scenario. After we validate our designs and see our simulations, we go back and do computer drafting where we create drawings. From those drawings, we go into the shop and make the design.

With 100 students involved in BadgerLoop, how are project responsibilities divided?

Max: BadgerLoop is split into two halves—one is business and logistics and the other is the actual technical engineering aspects. We are engineering a vehicle, so there are multiple disciplines of engineering. We have mechanical engineers doing physical design, then we also have a lot of electrical and procure engineers who are integrating electronics and software within the pod.

What's the makeup of the team—grads, undergrads, mentors, professors?

Max: We are almost exclusively undergraduates. There are a couple of graduate students, but the majority are undergrads. We have an academic advisor—UW professor Mike Cheadle. A lot of times, if we have questions, or are going into areas that are a little beyond our skill level, we'll reach out to the UW faculty here.

You mentioned SOLIDWORKS and ANSYS. Are you using any other software applications?

Max: Siemens sponsors us with NX, as well as Femap, another finite analysis program. We also use Comsol multiphysics software for magnetics modeling.

What are your most significant workflow challenges?

Max: The biggest challenge is the fact that we are undergrads, so it's difficult to learn a bunch of new software packages. But if we have the tools to do it, then we typically succeed at that.

Justin: Learning the pod typically a year or two ahead of my class, learning all these new techniques, and simulation software. I'd never heard of finite element analysis before BadgerLoop but now it's all I ever do. Learning these things is always a challenge, but it's fun rising to the occasion and making cool things.

Max: We have a lot of kids on the team, so sometimes it can be hard to share two BOXX computers. We have additional computers at school, but sometimes they're not optimized for the level of work we're trying to do. A lot of it is for basic stuff -training someone on the basics

of a CAD package versus going in depth and doing a full design.

Prior to your BOXX APEXX workstations, what type of systems were you using?

Max: Standard Windows computers provided by the university computer lab. You could say they were a good start, but once you start on the CAD systems and the assemblies become very large, they use a lot more RAM. They would get increasingly slow when we were working and at times, they would crash, which was a pain, especially when you have hours of work put in and you didn't save it. It was just really hard once you got into the details of doing a more complex design. They're lower power computers, so they were just becoming increasingly difficult to use.

How did you become aware of BOXX?

Max: I believed we talked to a BOXX rep at the design weekend in Texas last January, 2016.

Describe the experience of working on the BOXX workstations. What have they meant for the team?

Max: Just the fact that we can run a more so-



phisticated software. We can go a lot more in depth with our design. We can run better simulations. In the context of a finite analysis or simulation, it's always nice to know that the computers can handle it.

Justin: It was also a major improvement from the laptops we were using before. When we got the BOXX APEXX workstations, we realized we couldn't keep doing our simulations on our laptops. They had been taking hours—longer and longer. Once we got the BOXX systems, we all were trying to use them instead, because running simulations on them cut our time down from hours to minutes. When I run a simulation overnight and come back in the morning, it will be running smooth or finished. I don't have to worry about something going wrong or crashing, which was always an issue with laptops. BOXX improved our workflow.

Max: Oh yeah, and it was nice to not have to wait three minutes to open up our assembly files.

How much time do you think you've saved?

Max: We've saved hours and hours —especially during the design crunch. Also, if something turns out wrong down on the shop floor, we can just go back up and not wait minutes for it to open. That's a really nice convenience.

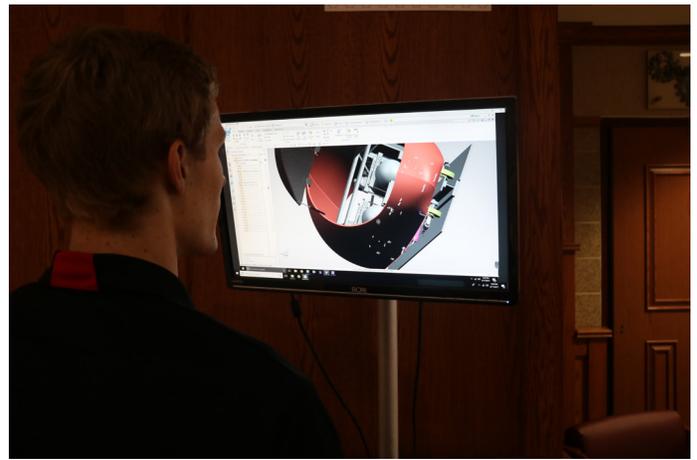
What kind of time was it taking to render before?

Max: There were times when it wasn't rendering. There were times when we had to compromise and tone down our resolution or the detail of the renders.

Have you ever had to contact BOXX Technical Support?

Max: No—never had to call and we're using the BOXX workstations a lot. Last year, we used SOLIDWORKS for our CAD, however, this year we switched to Siemens NX which is a little more conducive to a high-powered machine. We really like using BOXX because it supports NX so well.

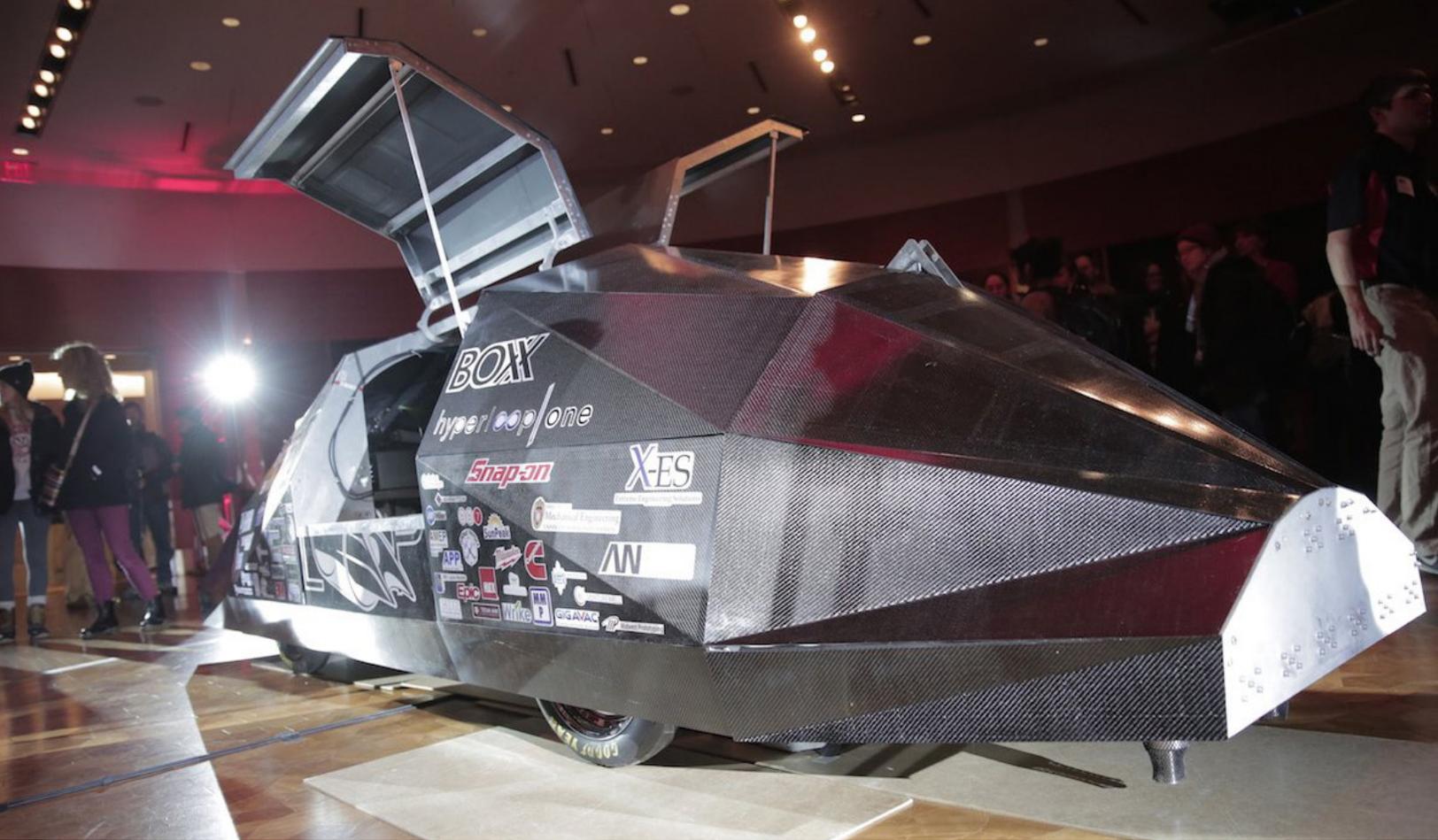
Is there any fighting over who gets to use the APEXX workstations?



Justin: (laughing) Yes, I'm pretty protective! It just sort of falls into a hierarchy, so being the lead simulation engineer, I get first dibs. After me, it moves down to the CAD and rendering people who really like using BOXX because rendering images of the pod take a while. The CAD people get it last because they can always use their laptops for modeling small parts. But yeah, there's always a little competition.

Speaking of competition, tell me about Hyperloop.

Max: In the beginning, we sent them our design and at the first stage, over 1000 teams applied. We told them we would love to be part of the competition. From there, we had to keep sending SpaceX power points of the design. From there, the competition was whittled down to 100—all universities and a few high school teams. It was narrowed down further to a final 90. Design weekend was in Texas in January of 2016. From those 90 teams, there were about 25 that moved on to California, so within that phase, our team placed third in the design portion. From there, we had to go and build our design. There were a couple of things we ended up tweaking. It was kind of a bummer because the competition ended up being postponed a couple of times. SpaceX ran into a few issues making the tube come to life. We originally planned to be in a competition last summer (after the January design weekend) because we wanted to stay on the schedule of having a competition every summer. After the January competition, they wanted to restart the cycle again. Now we're on to the second iteration of competition, so we have had to go through the process all over again —hundreds of teams that originally started out and you keep whittling them down



to another 30 that will actually go to California. Because of this, we revised our design and got pushed through to California for the next iteration that should be in late August, 2017. We're all really excited about it.



You have to tell me about the photo of Elon Musk sitting in the BadgerLoop pod. Does he do that for every team?

Max: We were the only pod that was big enough to fit a full-size human. It wasn't a requirement in competition to actually have a payload large enough to fit a human being, but we decided to do that at the beginning of the project because we thought it would be pretty lame to build a vehicle that couldn't actually carry anything.

We kind of figured that that would be our mark on the competition. It was exciting to see him sit in the pod. Apparently, he texted one of the SpaceX advisors the night before, asking to be shown a cool pod. We wondering if he would actually show up, so when he did and sat in our pod, it was very special for us.

Are you moving toward virtual reality in your design workflow and presentation?

Max: With VR, that was one of the features that really made our pod stand out when we were in California for the last competition. It takes a really sophisticated OS, so if we didn't have a computer like the BOXX APEXX, we actually wouldn't have been able to run that—not on what UW has here -normal computer lab systems.

You took an APEXX desktop workstation to the Hyperloop competition?

Justin: During competition week, we were all going to California and we didn't have laptops that could actually run VR, so we brought an entire workstation, set this all up for four hours and then we had to take it all down again and take it back with us on a thirty hour drive. It was

absolutely insane. When we saw the GoBOXX VR laptops on your website, I said, “This is why these exist—so we don’t have to truck desktops to California and back!”

Describe the future of BadgerLoop?

Max: BadgerLoop is a very innovative project. From year to year, we make a lot of design changes. It’s a very design-heavy project. When you have a design process that leads to simulation, the other drafting software, we have to keep innovating and changing our pod. That’s why we’re so very reliant on our BOXX workstations. It’s important to have those tools available to us so we can work in an efficient manner that gives us the opportunity to succeed.

As full-time college student, how do you find time for all of this?

Max: That’s the balance of what we do. A lot of times, we make the tradeoff for studying or even sleeping. The tricky part is getting people to keep their nose to the grindstone. It’s a big commitment, in addition to school, and if you have to have a couple of late nights just to meet a design report that’s due to SpaceX in a week or two, that can be a bit of an issue. At the end of the day, we think that this is really important to our education and we’re willing to make the sacrifice to make that happen.

Where do you see yourself in ten years?

Max: If Hyperloop is not taking off, it would be cool to continue to work for SpaceX-type industries. I think that’s a goal that a lot of us share.

Or Tesla.

Max (laughing): Or Tesla.

Justin: Once I graduate, I’d like to work in the high performance computing area. There are some cool companies doing cool things with cloud-based simulation. I’d like to help out. Working on the BOXX made me change my major. I realized how important it was to have good software, good hardware, and the both of them working together to give you results. I’d want to contribute to that.

Wherever you go, you’re going to have to buy another BOXX, you know.

Justin (laughing): Oh yeah—that’s going to be high on my list.

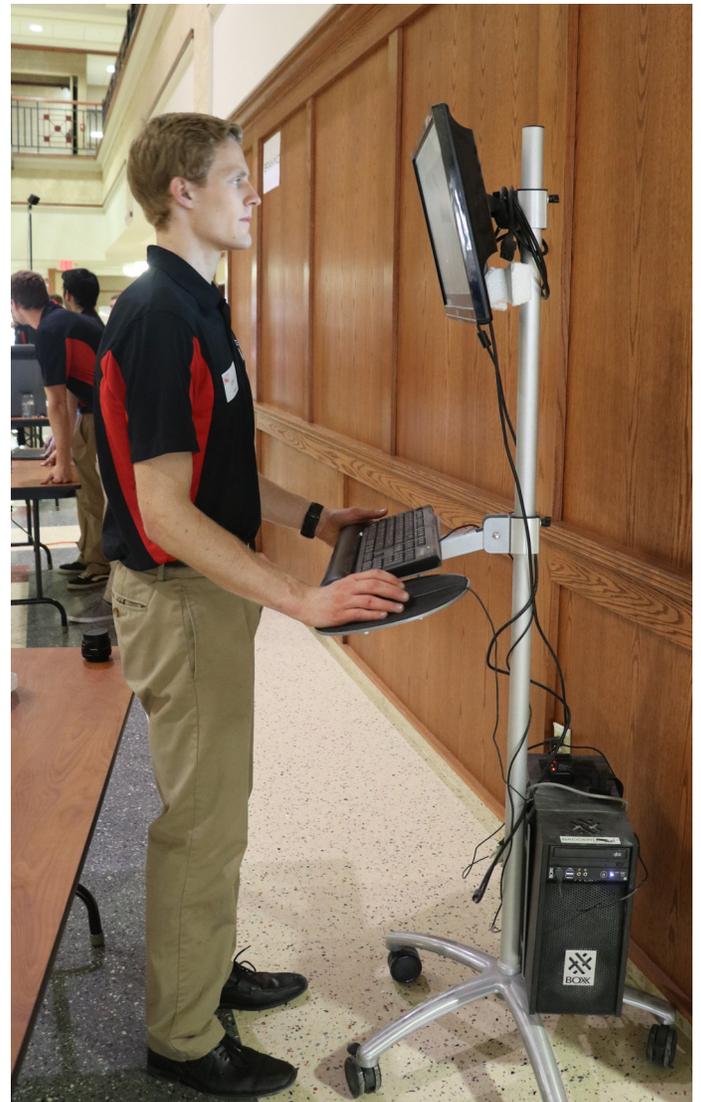
Our job is to see that you remain a loyal customer for life.

Justin: You’ve done a good job of that.

You have to evangelize for us.

Justin (laughing): There you go! I’d just really like to thank you guys. Without your computers, I don’t think we would have had a shot at producing the high quality designs that SpaceX was expecting. The school equipment just isn’t top notch enough to run our simulation and there’s no way we could have created the designs we’ve done. Thank you guys, thank you a lot.

Thank you for how you’re using them. We like being a part of this. ■





BOXX CUSTOMER STORY

BY: JOHN VONDRAK

In a candid interview, Orange County Choppers senior designer Jason Pohl and media & marketing advisor Jim Kerr cut up and cut loose on the business, their workflows, and why the world's most famous custom motorcycle shop is thrilled to be back with BOXX.

WELCOME BACK O



CHOPPERS





BOXX: So how are you guys enjoying your BOXX APEXX workstations and renderPRO?

Jason: These new machines are the cat's pajamas, man!

BOXX: I'm going to quote you on that.

Jason: It's ridiculous! I recently did a render that took about a minute and ten seconds and that same render took 47 minutes on the HP. Using V-Ray is awesome. We went ahead and got the renderPRO so both machines render at the same time in (Autodesk) 3ds Max—forty processors jamming along, man. I remember in high school, I had two processors that were overclocked and now I have forty. I find myself talking about it to random people at the grocery store:

"So I have forty processors now."

"You talkin' to me?"

"No I'm talking to the broccoli."

BOXX: Be careful—that could get you committed to an institution.

Jason: When we finally got all those buckets to start rendering in V-Ray, 3ds Max, it was ridiculous (followed by a solid impersonation of a heavenly choir of angels). It was like light shining through the building onto the computer. It was pretty ridiculous.

Jim: It was beautiful.

BOXX: So you guys were using HP before?

Jason: Yes and that's slang for Hewlett Packard.

BOXX: I see. What model?

Jason: Z800. At the time, it was a beast—six years ago. It's met its match. It's been formatted and rebuilt a couple of times. A couple of graphics cards went into it. I've burned through two (NVIDIA) Quadro K5500s. It had heat issues, man. Heat just kills electronics. It's already 97.8 degrees in our office here.

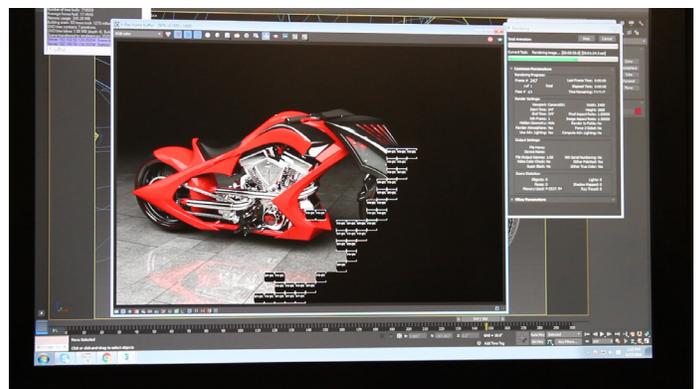
BOXX: So you must love the liquid-cooling in your new APEXX.

Jason: Oh yeah and it's so quiet.

BOXX: What's the biggest difference between it and the HP?

Jason: Render speed, man!

BOXX: That's what it all comes down to, doesn't it?



Jason demonstrates 40-core processing with APEXX 1 & renderPRO



Jason: Yes— that and the reboot time is amazing. I think that has a lot to do with the SATA drive. Towards the end, the HP was taking fifteen minutes to reboot. Rebooting the BOXX is under two minutes. The APEXX is adorable too. Cute as a button. I read to it at night—a children’s book of some sort.

BOXX: (laughs) In terms of your workflow, is that the biggest problem the APEXX 1 has solved—that now you’re working faster, you’re more productive?

Jason: It’s just an animal, man. It’s a machine. What’s cool is that instead of doing a single image rendering to show our clients what their bike could look like, we’re now able to render out a scene with camera fly throughs. I can zip it across the bike and see it all the way around. Before, I’d render three or four different views—the front, back, and sides. I still do that, but it’s so much cooler to send them a link and tell them to check out the animation. They see their bikes spinning around with that virtual camera and it really gets them going. It’s cool because it lets us show our client exactly what we’re doing. They can share in the vision. If they want to see something different, or say “Hey let’s do this or that,” I’m able to change it quickly and re-render it. So what used to take an entire weekend (and I remember I did that on the dragon bike—a simple 300 frame pan of the bike and it took an entire weekend) now with distributed rendering and both machines cranking away, will be waiting for me. It’s done tomorrow if not by the end of the day.

BOXX: So in concrete terms, you’re looking at a job and you say this used to take x amount of time to complete but now, that same type of job you’re done in what, half the time?

Jason: John, the biggest thing is . . . say I do want to render a scene. Now I can do a production render on that bike and keep working on the APEXX 1. The renderPRO is going full power, but I can keep working on the APEXX whereas before, I’d get the render scene all set up, I’d be working with Paul (owner Paul Teutul, Sr.) on the project, and he’s saying (imitates Paul’s gruff voice) “What are you doing?” and I’d say, “I’ve got to render out.” Then he would say “Ohhhh, okay.” And literally, I would hit the render out button and it would just bog down the entire computer. I couldn’t use any other application. I couldn’t even check email. Paul could say “What about that contract, or this or that?” and I’d have to tell him, “I can’t access it because I’ve already started a rendering and I can’t kill it because I can’t pick it back up from that same spot.” So whenever I had to render something, which was at least once a week since I’ve got to create a design, it would stifle the workflow on my computer so badly that I couldn’t do anything else. I was just paralyzed, so I would think, “Well I guess I’ll just go out in the shop, get coffee, do some cleaning, go get the vacuum.” Without that render time, it’s like Paul gained another employee because the renderPRO just keeps going, keeps rendering, and doesn’t stop. That’s huge! To be able to assign a job to the renderPRO and then to move on and do something else I need to work on is incredible power. I feel really stupid for not calling BOXX sooner.

BOXX: In your defense, you have been kind of busy, right?

Jason: It’s been busy but . . . I don’t know, HP was great back in the day. Paul did a Super Bowl commercial with them and on the TV show, they offered

everything we needed to get that going. Time and place. Now, I just wish we had done this sooner.

BOXX: What was it like, trying to make deadlines, before your BOXX systems?

Jason: Here's the deal. We're working on this client's bike and were jammed up. We have another bike due and we have to get this approved before the entire team can start working on it. I would get a rendering going and I always tried to plan it so it would jam out over lunch and there wouldn't be computer downtime. What would happen is I would come in, check the rendering and I'd think, (in an agonized voice) "Oh man, this took two and a half hours and I've got chrome, and ray tracing and this and that, kung fu fighting, and I look back and there's one brake caliper I forgot to put the green material on so its chrome. Or maybe the one gas tank, because its split in half, is a slightly different color than the other because I didn't assign something right! Basically, I would mess something up and it would inert the whole project. At that point, what I would do to save time and not have to do a whole hour and a half re-render, is render just that brake caliper and bring it into (Adobe) Photo-shop, pack it in there and try to make it look right. I don't miss that.



BOXX: Jim, how does your BOXX workstation differ from what you were using before?

Jim: Night and day. I wasn't as fortunate as Jason. The CPU I was using when I got here was really bad; I mean it would take days to download five photos. It was extremely painful. It was an HP too and it had been passed around through a couple of people before it got to me, so it already had a lot of internal damage done to it. Going to the BOXX, I'm using the APEXX 2, and it's just incredible. The downloads, uploads, everything just flies. No rendering time like Jason has with his bike designs. For me to render or do anything in Premiere Pro just takes seconds to build the images and video out where I can go back and view them and make more edits. A night and day difference.

BOXX: How much time has it saved?

Jim: I'm going to say seven.

BOXX: Seven?

Jim: Oh, I was just giving you a number.

BOXX: That's okay. I have you on tape so that's on the record.



Jim: Seriously, I'll bet you I save a good day a week, definitely.

BOXX: Really?

Jim: Oh yeah. And I do a lot of AIs for social media, so I have a lot of software that runs in the background doing stuff for me. It doesn't bog down at all with any of that. Just yesterday, I did a live stream from here and it was crystal clear using the BOXX. I was using the new Logitech C920 4K webcam and a Realtech shotgun plugged right into the APEXX 2 mic jack. It just worked phenomenally.

BOXX: Has there been a deadline you made with the APEXX 2 that you would never have made using the HP?

Jim: It the same thing Jason goes through. Paul or someone else will come in here looking for something and we have to knock it out. One example was a video Jason and I shot it in the morning and we had to have it to a very high profile client by lunchtime. There was a lot of footage, a lot of different takes, different angles, and we had to chop it up and get it in high quality. We didn't want to give him anything that didn't best represent him, Paul, or OCC. If we had to do that on our old HPs, we definitely would have failed.

BOXX: Jason, what's your creative process and workflow like? Does it differ from project to project? What applications do you rely on?

Jason: It's always different because each project is severely different. The workflow that I like is doing a lot of the engineering and modeling in Autodesk Fusion 360—anything that's hard numbers and things like that. For organic stuff like a dragon head, gas tank, or anything really super smooth or creative if you will, I use 3ds Max 2016. Everything ends up going inside Max when I do an assembly because it's the quickest. I just import an FTL from Fusion and start rocking and rolling and putting things together. That's where I build the bike—in 3ds Max. I use V-Ray 3.3 to render it out. From there, I'll



Jason does a quick sketch of the BOXX bike.

hopefully get a nice looking bike and then bring it into Photoshop and add some accents. Sometimes, paint schemes in Photoshop come a little bit easier than in 3ds Max. Finally, I create a spec sheet to accompany the bike design. That's my workflow. I sketch in Photoshop and Autodesk Book Pro as well.

BOXX: Do you ever create any video or animation?

Jason: I used to, but now with Jim here, he does that along with logos, special effects, and king foo fighting as well.

BOXX: Tell me about your workflow, Jim.

Jim: I do all the photography and in-house video. I use the APEXX 2 to download all the still footage from the cameras and video. They come from a couple of different sources, so there are all different formats.

BOXX: What kind of camera gear are you using?

Jim: Everything from Canon DSLRs to their (Canon) XC10 4K (camcorder), Panasonics, Sony—we have something from everybody here. My primaries are going to be the DSLRs and the XC10.

BOXX: What happens once you bring it into the computer?

Jim: I do some archiving and put it into separate folders—basically cataloging it. Then I bring it into Adobe CC.

I use pretty much everything in Adobe: Photoshop, Lightbox, After Effects, and then edit with Premiere Pro. I'll come up with a final still image to use on social media or posters and marketing, or chop up the videos and get those out to whatever platform we're using them for.

BOXX: Were you aware of BOXX prior to joining OCC?

Jim: No, I've just been here a little over two years now, so my intro to BOXX was just this past sequence we're working on now. Now I'm preaching BOXX to anyone who will listen. Your stuff is phenomenal. It blows everything else out of the water.

BOXX: What were you doing before OCC?

Jim: Twenty four and a half years in the (United States) Air Force. I retired from there and went on to do marketing, media, and social media for Gold's Gym. Then I was offered a job here.

BOXX: Do you like it?

Jim: Yeah, it's a great gig, I get up every morning and come to a place where I like working. It's different every day. I never know what I'm going to get when I walk in, what's going to be asked of me, and that's great.

BOXX: Tell me about yourself, Jason. What's your bio prior to Orange County Choppers?

Jason: I went to the Illinois institute of Art in Schaumburg. From there, I worked at Incredible Technologies, Golden Tee Golf and now OCC. I've been working with Paul for twelve years.

BOXX: How did you become aware of BOXX? Was it from our past relationship with OCC?

Jason: I can't say his name, but I'm going to try. Ed Caparerorera

BOXX: Ed Caracappa (former BOXX Director of Business Development, currently Sr. Director of Business Development at Avid Technology).

Jason: Yes! So I called BOXX years ago, spoke to Ed and he set me up right away. You guys ended up getting the chrome-framed chopper that we did for SIGGRAPH in LA, did that whole song and dance. It was a great time.



BOXX: So how did you become an HP shop? What did we do wrong?

Jason: You guys did nothing wrong! It was really that we were a victim of product placement and Nielsen ratings. The big cats came in, they meowed, and we had to deal with it. It was cool. There were a handful of guys over there at HP, at the workstation level, that really took care of me. Six years ago, it was a custom Z800, it wasn't an off-the-shelf type thing. I had 24 gigs DDR of RAM which was insane at the time (laughs), the GeForce card, the Intel Xeon. We even built a bike for Intel back in the day and it helped for that re-



For interview and demonstration videos plus more great photos, check out the OCC Customer Story on BOXX.com.

lationship with HP. It's kind of how that was introduced actually. Intel's was a quad core chopper and had two V-twins in it. They were promoting their quad core processors. We also did one for Go Daddy.

BOXX: I remember that episode.

Jason: That was back in the television heyday. Those were good times.

BOXX: Have you ever relied on BOXX Technical Support?

Jason: Oh yeah, I know Wil, Jesse, and some other guys.

BOXX: Take me through that. What happened?

Jason: I called them up a handful of times and said, "What the hell did you send me?" Where does this go and that go. . . (laughs). Actually, they got the APEXX talking to the renderPRO. They were great. No problems, it's been running really cool, really fluid, and really smooth. It likes a restart every other day—reboot the cache, the software, but that's fine. Takes two minutes and it's healthy for me because I always have so many things open and so many projects going on it reboots my mind too. Jim has a good tech story for you.

Jim: I had the BOXX maybe a couple of weeks to a month and the video card died, so I started losing one monitor and the next and the next, so I did the trouble shooting myself, replugged, rebooted, all that good stuff, but it just got worse, so I called BOXX Tech Support and the next day they had a tech out here with parts. He was here for maybe twenty minutes, replaced the card, got everything fired up and working, and I've had no problems since. BOXX Tech Support was outstanding.

BOXX: Jason, how many hours straight are you going on the new APEXX?

Jason: Eight or nine. But you know, I got into other stuff here. I've been painting, working on the price structure of the bikes, and I'll have a cell open doing the parts pricing for all the bikes, so it's a multitasking machine. I'm not just an animator working on the same scene where you get in a zone and just keep jamming along on the same kind of path. It's totally different. We're always evolving and moving, but as bike design goes, we try to start on paper first

BOXX: What percentage of your work consists of customers requesting specific designs and how much is you creating bikes on your own?

Jason: For the customer driven: about a handful of them come in and say, “I want a bike and here’s our brand.” Then they put the Windex bottle (for example) on the table and say, “Rock & roll—go to work.” That’s cool—it’s great. Then there are the guys who say, “I want my kid’s name airbrushed on the gas tank,” and I say, “Okay.” Then there are the really unusual ones like Wild Game Innovations. They wanted a giant skull of a European elk and I said, “Nah, we can’t do that. It’s too dangerous.” But they insisted, so we did it—the whole thing in 3ds Max and rendered it out. And when they saw it they said, “Yes!” Then our insanely talented machine shop, Jim Quinn and Mike Tampone machined all thirteen organic pieces, bolted and welded them together, and blended out this giant aluminum elk skull. Elk skulls are huge. They’re six feet and they put that on the bike and welded it to the frame.

BOXX: I thought this was going to be a cautionary tale where at the end you say the guy ended up impaling himself on the antlers.

Jason: (laughs). I was actually on the bike at a trade show in Louisville where, behind the curtain, the show floor was really dusty and I almost dumped it.

BOXX: That would be a bad day on the job. Switching gears, are there any other BOXX products you have your eye on? GoBOXX, maybe?

Jason: Definitely down the road because I could see a purpose for that. We really need to upgrade our monitors around here, so that’s probably next on the list. Webcams as well. Also, you guys have been after me to try this Teradici business. What is that—like a lasagna with cheese or something?

BOXX: (laughs) PCoIP technology for remote access. It’s terrific. We get a lot of great feedback from our customers who use it. You should try it.

Jason: Your product marketing manager says Teradici works a lot faster than what we’re currently using, so I might look into that next.

BOXX: How many hours per week has BOXX saved you?

Jason: I’ll agree to any number you say.

BOXX: (laughs) Then I’ll say three days a week. I’m a marketing guy.

Jason: (laughs) Maybe we should just reenact the scene from Office Space where they take the old printer out in the field. We could do that for you with our old systems. We were real close to doing that right before we got the new BOXX machines, so it might just happen.

Jim: Seriously, you have a great product and we’re excited to be working with you guys, the projects we have going on now, and what were going to knock out in the future. BOXX allows me to meet all of my challenges and put out the quality of work I expect from myself and others. ■



For interview and demonstration videos plus more great photos, check out the OCC Customer Story on BOXX.com.



“Yeah, I’m really happy to be back with BOXX and we’re going to make this relationship last a lot longer than the last one. I’m really thrilled with the speed of the APEXX 1 and the renderPRO too. It’s just freedom. It allows us so much more freedom. I’m not sweating over the computer, waiting for it. It waits for me, which is how it should be. I’m just thrilled to be back in the swing of things.”

- Jason Pohl

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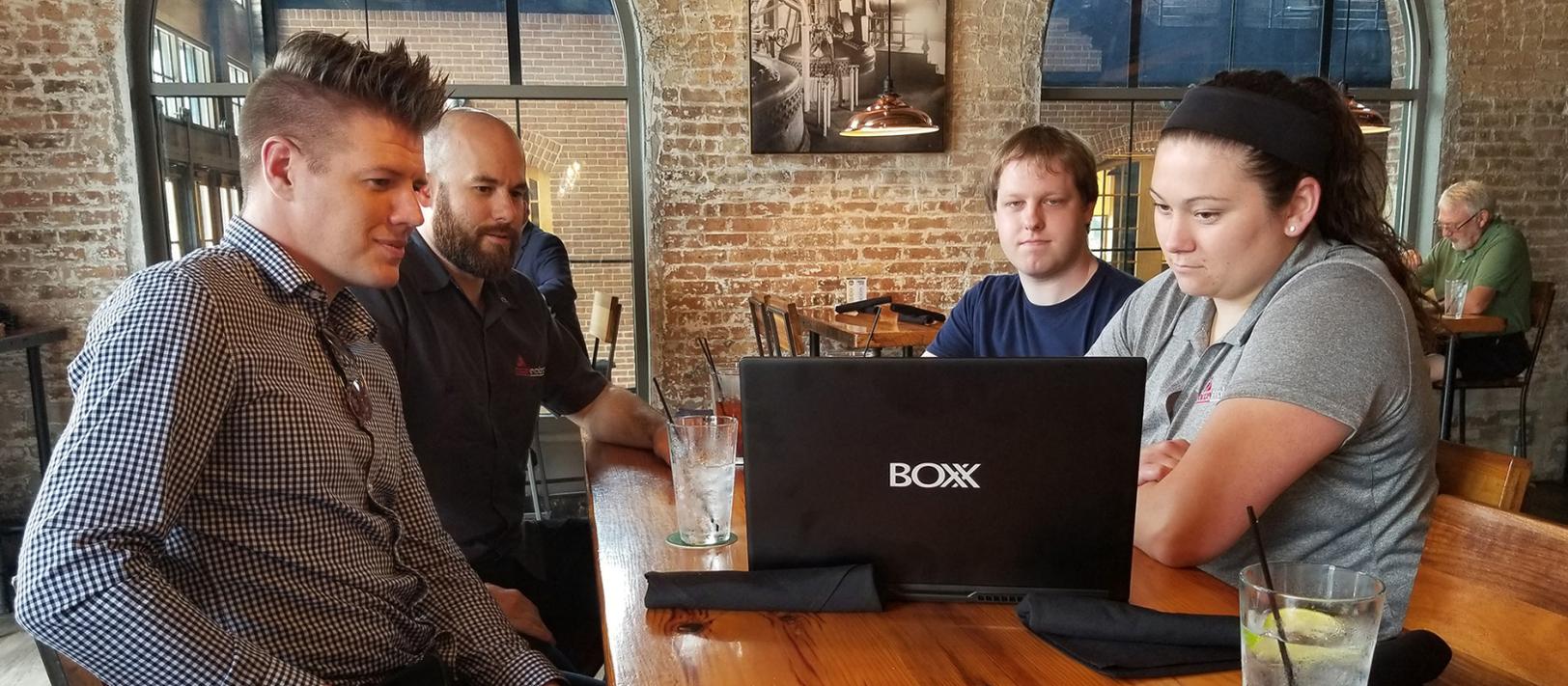
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ROCKET SHIP

BOXX solutions saved Accelerated Machine Design & Engineering \$20-\$50,000 a year, enabling the firm to put items "in space, in the ground, and in humans."

BOXX CUSTOMER STORY

BY: JOHN VONDRAK

As the leader of machine tool company development group, Mark Tingley led a team focused on leading edge technology. But in 2008, he left that company and founded his own enterprise, Accelerated Machine Design & Engineering (AMD&E), a Rockford, IL engineering firm with a footprint throughout the U.S. and beyond. The impetus behind Tingley's entrepreneurship is among the best reasons to start a business—recognizing a specific need. "I saw a need for both engineering solutions and high level systems engineering coupled with detailed design," he says. "It's the ability to manufacture prototypes in short order, along with manufactured production systems, and it's been a rocket ship ever since."

In addition to the quality and innovation of their work, much of AMD&E's success can be attributed to their ability to serve a broad customer base: aerospace, automotive, oil & gas, energy, pharmaceutical, bio chemistry, bio technology, automation, and other general industrial markets.

"Our skill set and capabilities were directly suited for aerospace and aerospace manufacturing," says Tingley. "But our process and engineering capabilities translate into just about any industry. Right now, there's a lot going on in pharmaceuticals, lab automation, automation of bio chemistry processes and bio science processes, and we're able to service a large amount of clients on the exploratory side of that industry."

Regardless of industry, Tingley insists that the creative process is always a collaborative effort as they move from initial idea to finished development by way of a curved or helical process (see chart). It also involves multiple iterations and the contribution of ideas from multiple sources. "As we take it through the process, we like to include feedback from a lot of different people from both inside and outside AMD&E," says Tingley. "We like to get user feedback from our clients and get them involved in the process as they are comfortable."

That process usually requires Dassault Systèmes SOLIDWORKS, Autodesk Inventor, and occasionally Pro-E and other professional software applications. "We'll look at sets of things and explain why they won't work, or steer the client in a certain direction because of specific reasons, and we'll support those with all the 3D artwork." Naturally, providing 3D assets to clients means that the creative process involves a fair amount of rendering. Although Tingley admits that most of the renderings don't reach photorealism until the final stages and that many are focused on marketing activities, his firm also relies on them extensively as communication tools throughout the design process. "A picture is worth a 1000 words," He says. "A rendering is worth a million words."

Armed with that understanding, AMD&E goes a step further by also providing animations. "That was some of our secret sauce from the earliest stages," he says. "When you can see a design exploded, going together in an animation, or see it as a part going through a process—if you look at it as an animation, that's so much easier to com-



municate than with a flow chart, diagram, or something like that. We were also early adopters of 3D as one of our value-added tools.”

AMD&E design projects require multiple tools and software packages (see chart) and their engineers are required to be experts in analysis, simulation, good design practices, materials, and manufacturing practices. This level of expertise, coupled with a command of their software and hardware tools, requires rigorous focus. “This means we have to have best-in-class engineering tools and hardware that will perform at a level that keeps things moving,” says Tingley. “Our engineers can’t be waiting on results.”

Dogs From Day One

From its inception, AMD&E needed computer workstations capable of not only supporting light duty SOLIDWORKS tasks, but also analysis, simulation, and rendering. In the beginning, they rolled the dice on Dell 690 desktops and Precision mobiles as the best options available (without spending on high end systems). Unfortunately, the result was less than adequate.

“I think they were dogs from day one,” laughs Tingley. “Our survival depended upon finding something more proficient and this just wasn’t acceptable. A lot of times, our users would open a model, then go use the restroom, get a cup of coffee, and get ready for the next shift so to speak. Anytime you wait, you lose your train of thought and you lose your motivation. You might set up to perform a task, but by the time the model opens, you mentally might already be on to something else. It was very frustrating.”

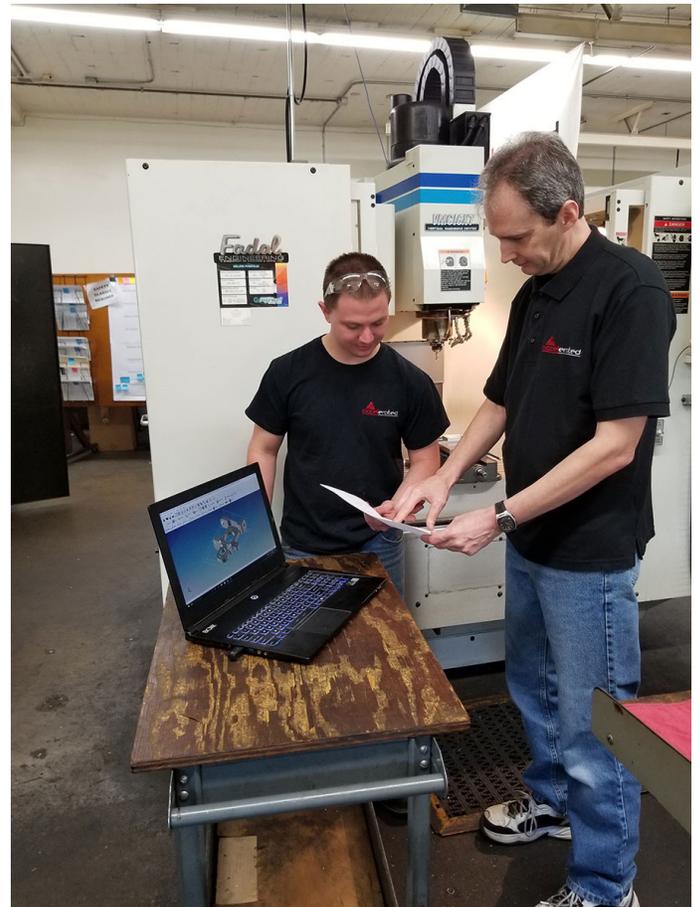
As Tingley discusses the complications and level of frustration that arise from relying on inadequate tools his tone turns more serious—especially when he recounts the events of 2009. “That year we had a number of large projects running simultaneously and each one required the design of large assemblies and massive amounts of finite element analysis,” he recalls. “Every day, we spent hours waiting for meshes to update and simulations to solve, and more hours waiting for large assemblies to open and drawings to update. Each one took between eight and twelve hours. If we didn’t mesh the model correctly, we may not know that for four hours. Or if we applied a boundary condition incorrectly, we may not know that for eight hours.

Every error we made, we wouldn’t find it until the next day, so we lost a day for every mistake. In addition to that, we just had so many simulations to solve that we didn’t have enough hours in the day. I have to applaud our team. We had guys that pulled multiple all-nighters in a row in order to hit deadlines. If not, we would have missed the deadline and probably lost the contract. We could have lost our entire customer base and reputation, so we did what we had to do to keep that intact, but it was all at the toll of our staff. I knew that wasn’t going to work as a long term strategy.

In search of a solution, AMD&E conducted testing on the latest Dell and HP workstations and carefully reviewed both manufacturers’ SOLIDWORKS standards performance tests. After thorough evaluation though, they found themselves right back where they started. “Dell and HP didn’t do any better than what we already had,” says Tingley. “We would’ve invested significant dollars and gained zero improvement.” The firm was looking for solutions that would provide the necessary performance with the mobility to work where their clients were located (or where the challenges arose). They also evaluated MySolidBox, @XI, and MSI—all to no avail.

The Way It Should Be

Following further fruitless evaluations of MySolidBox, @XI, and MSI systems, an online search led Tingley to an article in Desktop Engineering (now Digital Engineering) magazine. After reading it, Tingley made a phone call to BOXX and was immediately struck by the difference between the discussion he had with a BOXX performance specialist and previous conversations with other hardware



manufacturers. “With Dell, it was apparent that they had a sales pitch, but didn’t really understand our challenges,” says Tingley. “HP was sort of the same way, but when we talked to the guys at BOXX, they’re actual SOLIDWORKS users and understood our challenges right away.” (BOXX uses SOLIDWORKS to design their own workstation and render node chassis). According to Tingley, none of the competitor systems they previously evaluated had the “fit & finish and level of support” demonstrated by BOXX.

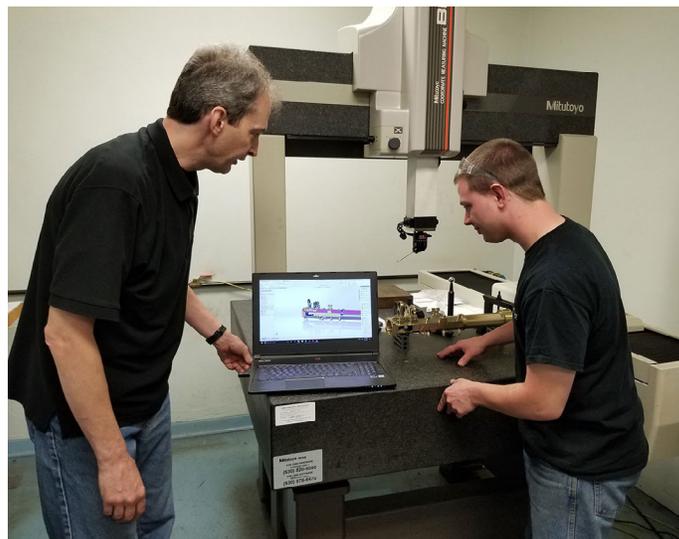
AMD&E initially opted for GoBOXX mobile workstations and then began adding APEXX workstations in the years that followed. The difference in the firm’s workflow was immediately apparent, but while many BOXXers go to great lengths to describe the euphoria of using their new BOXX for the first time, Tingley is much more matter-of-fact. “That first time, the thought process was, ‘This is the way it should be,’” he recalls. “It’s that simple. Heck yes, that’s the way it should be.”

“The way it should be” means that (according to Tingley) Finite Element Analysis, which used to consume six to eight hours, now takes less than 30 minutes. Renderings that used to take fifteen minutes now take seconds. Tool paths with the firm’s CAM programs used to require 30 to 45 minutes, but now only take a few. AMD&E engineers used to have to break their products into multiple sub-assemblies just to get them to open. Now they break them down into subassemblies that make sense for their product. “The bottom line is that we used to work for our computers,” says Tingley, “now our computers work for us.”

Tingley admits that there was the usual infighting over who was granted the privilege of using the BOXX systems versus who was forced to slog on with the Dells, but eventually all interested parties were satisfied as AMD&E transitioned into a complete BOXX firm. “We use them in a lot of different ways,” says Tingley. “We love the APEXX workstations. They handle our large assemblies, simulation, FDA, and animations, but we also need that same solution in a mobile package. We do a lot of work onsite at customer facilities. We work at our vendor facilities or sometimes we’ll even go to a local brew pub and have a creative session. Regardless of location, we need that level of horsepower in a mobile package. Prior to that, we weren’t really able to do thorough design reviews— especially for analysis and simulation of large assemblies. We’d have to create screen shots, and then talk through them and if you didn’t have the right screen shot, you’d lose a week or whatever. With GoBOXX, we’re able to take that right to our customer and have a good, thorough design review within a collaborative environment.”

No Time to Waste

With 30 years experience in business development, client acquisitions, machine tool building, and engineering service, Michael Sullivan, AMD&E director of business development, contends that upgrading to BOXX was essential not only for fostering a collaborative environment, but for company growth as well. “We have a very agile environment with two to six projects going on simultaneously and four or five engineers on typical project team,” Sullivan says. “We can take a napkin sketch and bring it all the way to lifecycle cost. With electric, mechanical, and design engineers working on the same platform, BOXX systems allow us to have a collaborative environment for creative



ideas. From a competitive standpoint, that’s a big part of our current strength and ability to grow the company. The industry is moving toward intelligent manufacturing—smart factories. Our challenge is to build the smartest machines in the world and BOXX is helping us do that at an accelerated rate. It’s amazing when you consider the amount of time allowed to provide a full plant material handling modernization with workstation off loaders. As a firm, we’re asked to do these things in a relatively short period of time. There’s no way we can do it without the technology BOXX offers.”

“On initial engineering, we have to deliver some type of results in four weeks or less,” adds Tingley. “On complete manufactured systems that we build, we’re looking at very complex systems that we deliver on a 16-20 week timescale or sometimes 30 weeks for an even more complex system. There’s no time to waste.”

Speaking of waste, Tingley estimates that prior to choosing BOXX, AMD&E was losing serious time and money. “If you consider the number of engineers and factor in the value of time, we were easily losing \$20,000 to \$50,000 per year,” he admits. It’s a sobering statistic, but AMD&E can’t afford to spend time dwelling on the past. As they look to the future, the firm is moving further into 3D. “We’re using 3D electrical software now so we’re adding another component to project management capability,” says Sullivan. “There are several advantages to it, so we’re continuing to demand more out of it by finding reasons to use more modules and features of platforms like SOLIDWORKS and others.”

The need for sustained growth is also critical when competing in an increasingly global marketplace. “The entire engineering and manufacturing industry has reached a point where companies are looking for offshore partners to provide low cost engineering and design services at discount labor rates,” says Sullivan. “We have remained competitive through technology investments, efficiency tools, and innovative automation of hardware and software solutions. We rely on BOXX as a way to keep us competitive. BOXX helps us put items in space, in the ground, and in humans.”

“What we’re saying here is genuine,” say Tingley. “BOXX has great products, they work for us, and we love them.” ■

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BOXX Customers





MY ACTIVE STUDIO

BOXX CUSTOMER
STORY
BY: JOHN VONDRAK

Steve Choo's boutique design, VFX, and animation studio, **My Active Driveway**, goes big with BOXX, creating national commercials for high profile clients.

Awhile back, BOXX Technologies' Inside Sales Manager Dustin Leifheit approached me regarding a customer named Steve Choo. "He has a company called My Active Driveway," Dustin said, "and I think it would make a great customer story." Dustin, like all of our performance specialists, occasionally feeds me the names of BOXX customers (or BOXXers as we like to refer to them) that other BOXXers, and those who wish to be BOXXers, may enjoy learning about. Since we try to alternate our customer story subjects to equally represent our different industry segments I'll confess

that my response to Dustin's suggestion was decidedly lackluster. I had just completed an architecture/construction customer story and was not keen to immediately follow it with another. "I just wrapped an AEC story," I said, "so I may hold off on this one for awhile."

"It's a VFX and animation studio in New York," Dustin replied. I was having trouble reconciling the name My Active Driveway. It sounded as if they were into concrete, building driveways or roads. "Interesting name, I know," he smiled.

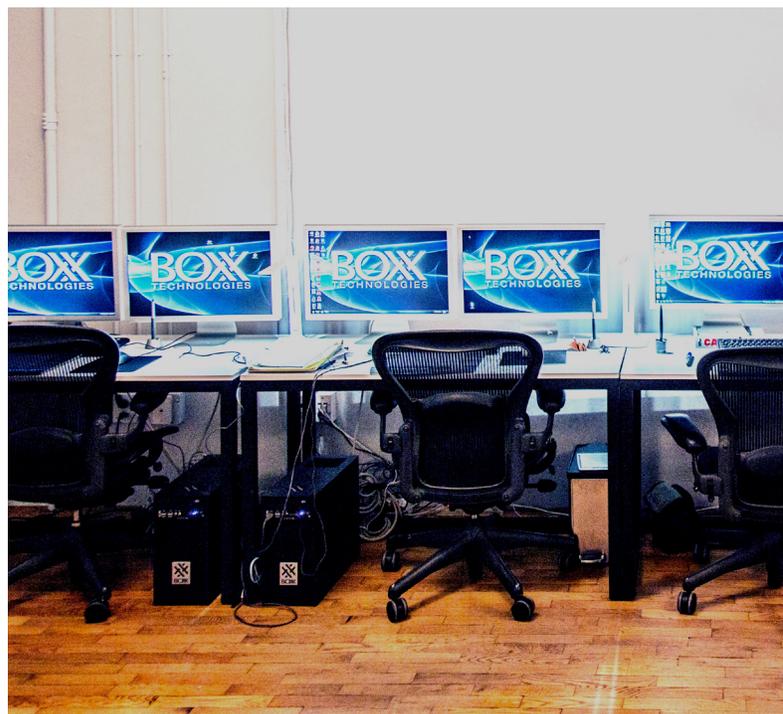
So, when I first reached the perpetually busy Steve Choo, my first question was obvious. “What’s with the name?” I inquired. After first insisting that it was “really not a great story,” he relented. “When I first moved to New York,” Choo said, “I was trying to go to a friend of mine’s art gallery opening. I was driving around the Lower East Side just looking and looking for a parking space and every time I thought I had found one, there was a ‘No Parking: Active Driveway’ sign there. So I said to myself, one of these days, if I ever open my own company, I’m going to have my own active driveway.”

Making a Go

Steve Choo arrived in the Big Apple right after graduating with a BFA in painting from the Kansas City Art Institute. He went to work as a Flame artist, then a 3D Maya artist (prior to its existence as a power animator) in the production department at BBDO, the worldwide advertising agency. Yet in the wake of 9/11, he decided to start his own company.” It was a time when a lot of my friends were leaving,” he recalls. “They just left town, some going as far as to leave the country, but I decided to stick around. I was going to try and make a go at starting my own company in New York— try to rebuild a little bit here and keep the work local. It might have always been in my subconscious, but after that day, my thought was ‘You never know what’s going to happen tomorrow, so if I want to do this I should do it now.’”

So My Active Driveway INC. a boutique design, VFX, and animation studio, was founded in New York City in 2001. According to Choo, the past 15 years have seen the studio scale up and down in staff size, property, square footage, machinery, and equipment. “We’ve made ourselves adaptable to the industry’s climate, says Choo. “Having come from an agency background at BBDO NY, I had a solid understanding of the ups and downs of the industry. When business is good, we’re running on all cylinders, pumping out work as fast as possible. But when there’s downtime, you want to make sure you’re not just burning fuel.” Choo believes that this level of experience and understanding ultimately led him to BOXX. “It’s why,” he says, “after trying so many other products, we stick by BOXX as the backbone of our studio.”

At one point, Choo and his My Active Driveway team did what a lot of other studios have tried. In an effort to save money, they built their own systems instead of adding to or upgrading from their existing Dell computers and BOXX workstations (in this case, a 2008 model 3DBOXX 8404 and a 3DBOXX 4860 purchased in 2011). “Workstations, custom render farms, and custom servers,” Choo recalls, “you name it, we tried it. We always thought, we can save money by just doing it ourselves and that sort of worked for awhile—until it didn’t. Then we were in a deadline and panicking because there was no support for our custom-made equipment that broke down during the job.” To make matters worse, there were other mitigating factors that Choo had never really considered. “Honestly, in the long run, if you calculate all the hours and research, as well as enormous electric bills, we wasted a lot of time, money, and frustration,” he admits. “Not to mention, every freelancer that worked with us was always fighting over who got to use the BOXX workstations, rather than our custom builds, or even the Dell systems.”



BOXX Makes it Possible

In the beginning of 2015, My Active Driveway decided it was time to rebuild their office—and as a byproduct of that process, also made the decision to revamp their computer hardware.

First, they said goodbye to their massive 120 core AMD Dell render farm servers and replaced them with eight renderPRO nodes neatly stacked on top of each other. “We went for a clean sweep,” says Choo, “so we also started fresh with all-new APEXX 2 workstations for everyone.”

under a three week deadline. There’s no way we could have done that had we not just upgraded all of our equipment to BOXX. It was clear and seamless across the board. Everyone had the same system, the render farm worked beautifully, and we were able to ship and deliver under this crazy timeline.”



Choo selected the compact, liquid-cooled APEXX 2 Model 2401 featuring an Intel® Core™ i7 safely overclocked to 4.5 GHz and NVIDIA Quadro graphics cards. The end result of the hardware overhaul didn’t go unnoticed. “The performance boost was insane,” says Choo. “Using Autodesk Maya on the workstations and Arnold on the renderPROs, we were able to render a sixty second, all-character animation spot for the National Hockey League (NHL) in less than 48 hours. That was roughly four times faster than what we had before.”

The NHL commercial was actually the second spot My Active driveway had created for the NHL. “They approached us,” Choo recalls. “They were looking online, came across our website, saw the work, and reached out. They were extremely nice and super supportive—a great client to work with.” Undoubtedly, the League wanted another ad after Choo and company so quickly turned around their initial assignment. “The first one we did was insane,” he says. “I think it was a 30 we conceptualized, designed, animated, rendered, composited, and finished

Seemingly impossible timelines are often routine at My Active Driveway, but Choo recognizes that quick turnarounds, along with the outstanding quality of their work, are what keep the studio humming along. “That’s how small companies like us stay in business,” he admits. “We have to take on the crazy jobs that other people don’t want. They don’t want the headache of it all, so we get a shot at it.”

And the heavy hitters keep on coming. At the time of this publication, My Active Driveway was creating seventeen character animation spots for Lowe’s Home Improvement, another high profile client already on their reel. “But this type of work is new,” says Choo. It’s photoreal CG. I think you’re going to like it when you see it. The spots are trickling out. The first four have already hit the airwaves. We have another four weeks to finish the rest. Two more next week. For such a small shop to put out this volume of work says a lot about who we are and what we’re capable of.” Choo is quick to credit his BBDO history with making the Lowe’s work possible. “Having worked there,” he says, “I have

that connection. They've been one of our clients for years. BBDO is a great agency. They've been very supportive and we've done a lot of work for them. When they need us, we just take care of it—again, it's taking on the jobs that others think are simply not possible."

My Active Workflow



When asked to discuss My Active Driveway's workflow, Choo admits that he doesn't consider it unique. "I don't think our workflow is vastly different from anyone else's," he says. "You start with a concept, you get approved boards, you move into model rigging, pre-vis, animation, render, and then composite. We use the Adobe Creative Suite—mostly After Effects, Premiere Pro, Photoshop, Illustrator, and InDesign. Depending on the project, for composite we do either After Effects or Nuke. For 3D, we work in Maya and render out using Arnold. The biggest difference in our workflow is that we're a small shop. We don't have dedicated IT people, we don't have dedicated render techs, we don't have dedicated anything. We have a limited number of seats and we have to do the most with those seats, so a lot of our people are multitasking and wearing different hats."

In addition, those limited number of seats are installed on a limited number of workstations,

so if one system goes down, Choo says, "it's a pretty big deal." That's why he considers BOXX APEXX workstations and renderPRO render farm among the best business decisions he's ever made. "I don't like to name names," he confides, "but if you deal with a bigger company you have to go through this RMA process. Then they see if your support is really validated, if it warrants the claim. They definitely won't ship overnight. I love the fact that I can call BOXX, somebody will pick up the phone and I can tell them what's going on and you guys don't hesitate to ship out a new part that can be easily replaced overnight or even ship a new, complete workstation. My downtime is minimized. Just knowing that I bought systems that have that kind of support is invaluable. I'm the tech person here, so I'm the guy who has to fix a machine if it goes down. I'm also the one who's paying for it."

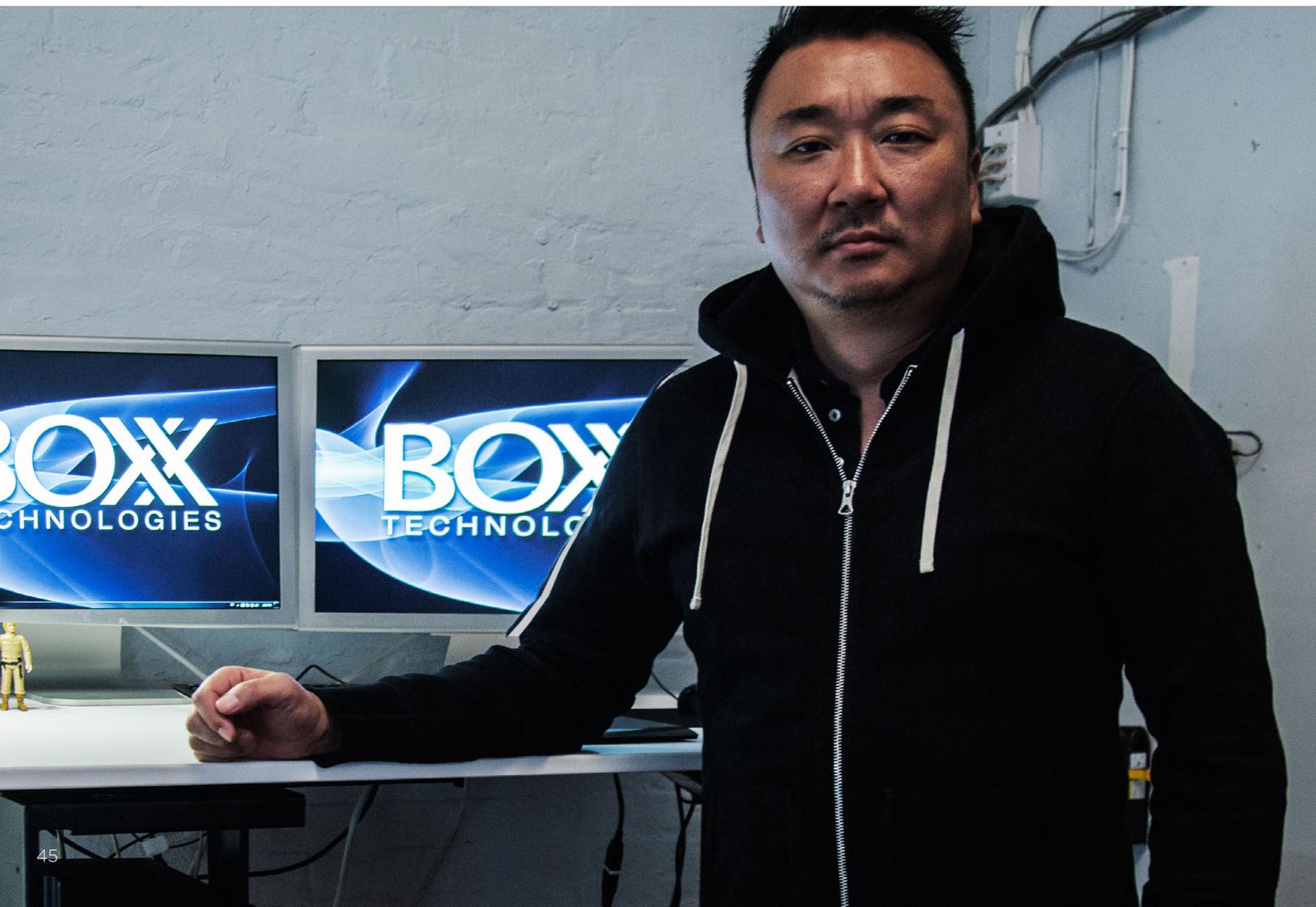


Customer for Life

Regarding the future of My Active Driveway, Choo admits that he would love to expand his render farm. Yet even with his compact renderPRO modules, studio square footage is at a premium. “We’re in the middle of a space constraint right now,” he admits, “but if I could have ten more renderPROs I’d do it in a second simply because everyone wants to use them all the time! Its one thing when you’re creating a single spot, but when you have seventeen starting to overlap and they need to get these renders out, we’re at a point where the render nodes are going day and night. They also make revisions on these spots, so it loads up. Then the Nuke artists want to use it to render the nuke comps on!” Despite the renderPRO render farm running “day and night” Choo points out another reason why a BOXX render farm was a brilliant business decision. He refers to it as “another beautiful side note.” My Active Driveway’s electric bill dropped from over \$4000 per month to under \$600. “That’s how

much energy those old, slow, giant machines were wasting!” he exclaims.

Accelerated workflow, increased productivity, making deadlines, saving money, and . . . if it seems like Choo has covered all the bases, he circles back one more time to emphasize what made him a BOXXer—legendary technical support. “That was perhaps the biggest factor in choosing BOXX as the backbone of our company,” he says. “I can’t express enough how essential it is to feel like you matter as a customer. If I have a problem, I call BOXX support and they answer the phone—fast! They treat me like I’m their best customer. If there’s a problem with the system, they take care of it immediately, no questions asked. I really admire and appreciate the fact that I get big company level support from BOXX when we’re just a little shop like this. That’s the kind of service that makes me a customer for life.” ■





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STORY

The East Tennessee State University (ETSU) digital media program educates 300 undergrads in four key areas of concentration: animation, VFX, visualization, and game development, and according to department chair Marty Fitzgerald, game development and animation are the majors that typically attract incoming freshman students. However, once they've settled in, the reality can be very challenging. Some students realize they don't enjoy it as much as they thought they would and change majors, or some, for example, may discover that they really like related disciplines like modeling or video. "Part of what we do is say that there's a lot more to this than just game development and animation," says Fitzgerald. "We need people that do lighting, texturing, modeling, rigging, level design, and more."

Fitzgerald says the program also has students in pursuit of careers outside of media and entertainment. Some arrive with undergraduate architecture degrees but are missing the digital media component. In another case, a student set on a career in criminal justice wanted to do video work for the FBI. In each instance, ETSU was able to help. "We try to be a little bit flexible because everyone is different," says Fitzgerald.



CLASS PROJECTS

Fitzgerald says student projects begin by defining a goal—the desire to create something. They'll look at references, like a collection of photos. If they want to create an animation, they may shoot a reference video. For a multi-shot video, they might storyboard. If it's single shot, they may go to work blocking it out. For a model, the students may rough it out and decide what the workflow would be. There are also a number of questions which need to be answered. "If we're modeling, do we want to start right in ZBrush with a hi-res sculpt and see where we go, or do we want to start with

a low poly base?” Fitzgerald asks. “Depending upon what we think, we may start with photography. We’re doing more of that lately where you take a whole bunch of photos of something, generate a hi-res mesh, and then get it down to a low poly image with quad and what everyone can deal with. If it’s a game project, it’s probably a team of students with us assigning roles. There’s a certain amount of creative discussion about where we want it to go and how we want it to feel. As for project roles, we want to determine the animator, the set designer and environment, followed by the standard group project factors like due dates, how we plan to make project deadlines, things like that. It’s fairly standard issue. No one wants to work at something they don’t like or are not good at, but every group has that person who doesn’t do the work versus the people who always do. The labs are open 24/7 with card access, so you know who’s here at 4am and who isn’t.”

SOFTWARE APPLICATIONS & CHALLENGES

Students in the ETSU program rely primarily on Adobe CC, ZBrush, Autodesk® Maya®, and Mudbox®, and Substance®. “We definitely try to stay with what is used in the real production world, says Fitzgerald, “and after you’re good at the software, you have to take that skill and make something. Do you have a good eye for form? Do you have a good eye for color? Are you good at positioning and editing? At the end of the day, you need to show me something which will make me say ‘Wow, look at that.’”

Fitzgerald says that with student projects, the first step is making your creation work and it is rare that a student animator will create first-rate animation from the outset. The aptitude of ETSU students runs the gamut from artists to computer techs, and although technically minded students may worry about their drawing abilities and artists may fret over their programming capabilities, communication is the key. “You just need to communicate with your team what you’re doing,” he says.

BECOMING A BOXX UNIVERSITY

Fitzgerald first discovered BOXX at SIGGRAPH 2011 when he was in search of a workstation for his own personal use. A visit with former BOXX Sales VP John Civatte proved to be a fortuitous encounter. “John was helpful because I told him

I do 3D as well as video and needed 4K capabilities as well. He recommended the 3DBOXX 4920 XTREME and it’s been great.” In fact, he liked it so much he recommended that ETSU retire their eighty Dell systems and replace them with BOXX workstations. I asked him how that conversation went. “At ETSU we generally replace the computers all at once so everything is the same, consistent hardware,” says Fitzgerald, “although it is kind of a budget killer.”

Throughout the process, Fitzgerald had been in consultation with BOXX performance specialist Brad Jones, a seasoned pro who also happened to be a former Dell sales representative. “Working with Brad was a good experience,” says Fitzgerald. “I contacted him, said what we were thinking of doing, and in an effort to save us money, he gave me a base model quote, which I would have done too.”

“When discussing solutions with Marty, I led with one of our most popular workstation solutions that met his requirement while keeping costs down,” Jones recalls. “As I tell many of my clients, there is a good, better, best solution for any workflow, but budget is always the determining factor. After discussing our offerings and performance options further, I quickly realized Marty was dedicated and determined to deliver the most powerful tools possible to his students. That’s our mantra at BOXX—the right tool for the job, so we worked together to ensure that each component met the requirements of his workflow and was the best option inside his budget.”

The workstations of choice were APEXX 2 2402 models—a BOXX best-seller. The liquid-cooled APEXX 2 2402 features a four-core Intel® Core™ i7 professionally overclocked to 4.4GHz, making it ideal for 3D animation, modeling, and 2D image processing workflows. The perfect solution for single-threaded applications, APEXX 2 is also recommended for 3D CAD applications like AutoCAD and SOLIDWORKS. The compact workstation is configurable with up to two professional dual-width NVIDIA® Quadro™ or AMD® Radeon Pro™ graphics cards, SSDs, and up to 64GB of RAM.

Fitzgerald was also interested in upgrading his department’s 2006 era monitors, but when he asked his BOXX specialist about purchasing them through BOXX, he was impressed by (and

grateful for) Jones' honesty. "We try to save money every place," says Fitzgerald, "and Brad was so honest saying 'you can get them directly from the manufacturer and save the money', which we did. We got these awesome 34 inch curved screen monitors."

As for the new APEXX 2 workstations, by the time the department funds were allocated, Fitzgerald's time to deploy was incredibly tight. "I was under the gun," he recalls. "I thought 'Oh my gosh, were not going to make it in time!' I can't start classes without computers. Thankfully, the fact that BOXX is a smaller, efficient, and agile company led to a quick solution."

"I asked Brad if we could get one of the machines out very quickly to our IT people so they could start building our software image because that requires some time. They could then send the other machines as they come off the line. The manufacturing and production people were very helpful. They got one out and sent it overnight to our IT people. The process we use to get all the software onto the machine is to build an image and ghost it onto all the machines. They build it remotely at the IT facility, so we do one session where they get the software onto all of the machines along with an identical image. That process takes a few settings, so you have to boot off of the network card and be ready to receive. In order to get that to work, they had to work with BOXX Technical Support on the BIOS. Our IT group said BOXX tech support was good, very quick, and low drama. They got right on it."

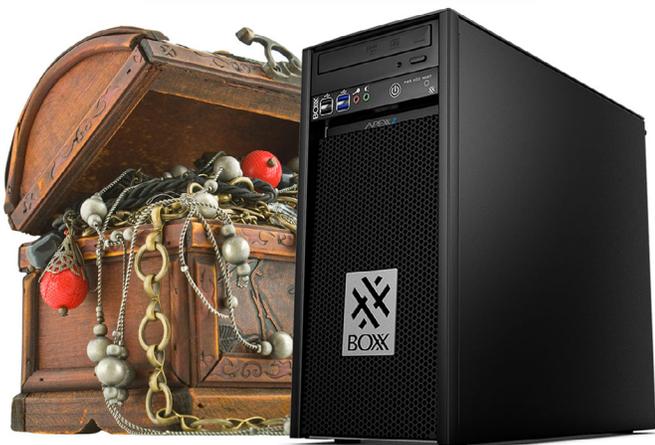
ELITE WORKSTATIONS

When discussing the department's previous workstations, Fitzgerald is less critical than oth-

er former Dell users, insisting that the former systems, "were not that bad." "The Dells were beefy," he recalls, "16-core Xeons, 32GB of ram, Quadro graphics cards, and SSD boot drives. But they came with a big price tag. The BOXX systems were actually cheaper in terms of dollars per horsepower. We spent about half as much as we did on the Dells and the BOXX workstations are great while also adding a marketing advantage. The Dell name is so ubiquitous. They sell small junk boxes that are good for sending emails and that's fine. But now we're able to say you won't find Dells here like you do at other university programs. Using elite workstations lends more credibility to our program. It differentiates us. Lots of universities have some flavor of digital media and based on the size of the school or program, it may be a webpage building program, a little Photoshop, a little graphic design, and that's just not what we are. We're a production facility turning out 2D and 3D artists ready to go into professional video games, animation, and visualization, and that's reflected in the computers we have. We go beyond replicating a professional environment, using professional workstations specifically designed for this type of work. No student coming in here is going to have a BOXX at home."

As the years go by and it once again becomes time to upgrade to new BOXX systems, Fitzgerald plans to move the current APEXX workstations to the school's render farm, which tends to be in use around the clock. "It depends on where we're at in the semester and which projects are due," he laughs. "They're students. A lot of them think they can do it the night before, so the render farm gets very busy toward the end of the semester."

Undoubtedly, a render farm consisting of 80 BOXX APEXX workstations will be more than up to the task, but for now, Fitzgerald is simply happy to have ETSU students working on state-of-the-art workstations. "The feedback has been great from students and faculty," he says. "The APEXX workstations are smaller, lighter, faster, and quieter. The decision to go with BOXX has paid off well." So well, in fact, that ETSU has since added another lab and outfitted it with seventeen more APEXX 2 workstations. ■





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BOXX CUSTOMER
STORY

BY: JOHN VONDRAK

THE ANIMATOR

Meet Webster Colcord, the animator and motion capture artist who relied on a battle-scarred BOXX workstation to bring **Ted** to life.



A native of Eugene, Oregon, animator Webster Colcord went to work for Vinton Studios right out of high school, cutting his teeth on projects like the Emmy Award-winning *A Claymation Christmas Celebration* and Michael Jackson's *Moonwalker*. This was followed by years of freelance and studio work that includes countless commercials and Hollywood productions like *James and the Giant Peach*, *Antz*, and *X-Men: Day of Future Past*. Most recently, Webster has earned raves for his outstanding motion capture work Seth MacFarlane's *Ted* films. Currently animation supervisor at Atomic Fiction (*Star Trek: Into Darkness*, *Flight*, *Cosmos*) in Oakland, CA, Webster generously agreed to share his time by taking a few questions.

Growing up in Eugene watching King Kong, The Seventh Voyage of Sinbad, Bakshi's Lord of the Rings (did you watch American Pop as well?) did you have any aspiration to become a filmmaker, or was it always the quality and creativity of the animation itself which inspired you? As a side note, did you ever see Watership Down? Like Bakshi's rotoscope stuff, the overall look of that animation really blew me away as a kid. A few years back, I found the DVD for my own kids and it scared the hell out of them at first, but they love it now.

I have seen *American Pop*, but not as a kid. That one wasn't in theaters very long, as I recall. *Watership Down* scared the hell out of me as well! I wanted to be a cartoonist, comic book artist, and at one time

a make-up FX artist. I think it was more the desire to make monsters than to be a total filmmaker, but as I got older, I started understanding the visual storytelling techniques of film and I wanted to try my hand in it.

You were fresh out of high school when you created the "audition" sculptures for Vinton Studios. Had you been creating sculptures throughout childhood and had you ever attempted to shoot any stop motion with them?

In my teens I shot a lot of experiments both on film and video. For animation, you really had to use film back in those days. The single-frame recording capabilities of videotape were never very good. So I started with Regular 8mm, then Super 8mm, then 16mm. I tried all kinds of techniques in those early experiments; double-exposure, split-screen with live action, space shots, a little bit of rear projection, replacement animation, foreground miniatures, glass shots... none of it was very good. But yes, a lot of sculptures and little animation puppets -and a lot of pyrotechnics!

Yours is an impressive resume. Was the transition from clay to digital animation difficult, or did it seem like more of a natural progression for you?

It was difficult! I did have some prior experience getting slightly familiar with digital animation. My buddies at Hash Animation in Vancouver, Washington had given me a copy of their software (*Animation Master*) to learn on, and I had fooled around a little. At the time I made the transition in 1997, I had my own small animation studio in Portland, Oregon

and I was producing and directing commercials and interstitials. I had worked on a couple of feature projects, but it was quite a shock to suddenly be neck-deep in a big initial CG feature within a large-ish studio. That was *Antz*, at PDI (newly a part of DreamWorks at the time) and there were all manner of difficulties.

What I discovered was that Hash Animation Master was sort of advanced! At the time, most of our animation at PDI had to be done using a spreadsheet. There wasn't really a graphical manipulator, or poser, until later on. We were using the new SGI O2 machines, which were new and hot at the time, and I was learning Unix. It was really diving into the deep end of the pool!

For about a year, I struggled and then suddenly had an epiphany. It was that even though it was dimensional animation, I was hurting myself animating sorta' straight-ahead like you would do in stop-motion. The former cel animators seemed to make the transition easier, and that was because they were working pose-to-pose and locking those key poses down across the animation controls. I was also learning that in CG, your brain is pretty much the only muscle you're using, and you have to be very disciplined in organizing your work to be edited and iterated on later. Before that, I had worked fairly intuitively and loosely in stop-motion, where you actually get to use your body in your work. The whole exercise of learning CG made me more disciplined in stop-motion as well—more cerebral.

In addition, starting in a very structured studio where everyone was a specialist in their specific

departments, where animators only do animation, was sort of coming into CG backwards from how artists learn CG today. Instead of learning CG from the ground up, I learned from a specific discipline and have been working backwards over the years to become a generalist. That has been a really interesting learning process, and I'm still just a remedial modeler!

You mentioned to CGSociety that after owning your own shop you were tired of working alone in your studio and that you wanted to learn new things and be part of a bigger team. Please explain that need or desire as I think some creators, in regard to the bigger team aspect, might want to go in the opposite direction.

Well, it's a tricky thing. If you tend to be your harshest critic, which many artists are, then you start to become paranoid about being in a vacuum and you doubt the accuracy of your own judgment. And by-and-large, it's easier to learn from others around you than from written documentation—more so because an animator sitting next to you has searched out the exact same problem you're encountering and has already done the legwork to find that (usually undocumented) work-around.

Of course, you also want to be locked away in seclusion and work on your "masterpiece." Animators tend to take it to the extreme though and spend months and years in seclusion, working on their films. You just get tired of being alone, I think. You want the "esprit de corps" of working in a group. Then after working in the group, you want to be alone. It's a pendulum.



Your work on the Ted films is incredibly lifelike and seamless. You already gave a great description of the motion capture process to CGSociety, so I'll not ask you to rehash that. If you could though, please add any additional information, especially regarding the challenges your workflow presents.

Well our VFX supervisor, Blair Clark, was adamant that we not do anything "too different" that would result in a change in the character, so we took incremental steps. We improved the look of the real-time hardware rendered Ted (which is what the crew sees on-set) and the post-vis Ted model,



It's really a standard workflow. We capture the motion, do a little processing, sync up the takes and send them to the VFX houses that use animation layers to enhance the acting. They also keyframe the lip sync and a lot of other stuff. For our post-vis, we use a slightly older method, where we use a multi-skeleton rig that blends the mocap and keyframe.

The only thing we're doing different is we're being very mobile about the capture set-up, doing it on location when possible, and the actor in the suit is also the director. That makes a huge difference and it's an unusual situation. Seth (MacFarlane) is very specific about what he wants and is using the tech to ensure the performance comes out how he envisioned.

Some of the locations were extremely challenging, and rough on the gear. We had some bad weather in Boston and cramped conditions, shooting in tight spaces—tiny bars, the diner, Tom Brady's bedroom. We had the dedicated BOXX that runs the mocap system in a protective case, but it can only shield so much from heat, dust, dampness, and bumps. And every day, it was on-and-off the truck. For those tight shooting spaces, we would have to take it out of the protective cart and set it up free-standing on the floor of a location.

Were there greater advances in technology (coupled with your own experience) that made the second film any easier?

and we re-designed the way we use the suit so that application time was cut way down. Every second counts on a live action set, after all.

In the middle of our Ted 2 the production schedule, however, Xsens, the makers of our mocap suit, released a radically better version of their system which uses much smaller sensors with great improvements in their software. So we used that suit for a big musical number featuring Ted and a huge cast of dancers. For that one sequence, four different dancers wore the new Xsens suit, each of them playing Ted in different sections of the sequence. That was really challenging, fun, and a real test of Xsens' new system. It worked really well.

Describe the experience of working on the BOXX system. How does it differ from other systems you've used?

Always very reliable and never any hardware problems that I recall. I do recall having a power supply in a machine, it wasn't a BOXX, go out at The Orphanage. It was kind of scary, a big "zap" and a burning electrical smell.

What workflow problems has the BOXX systems solved? In toher words, what it has meant for you in terms of time saved, deadlines met, etc.

The BOXX unit that we purchased in 2011 on Ted has been in and out of my professional life for four years

now. Because Seth MacFarlane's team produced the new Cosmos, I ended up working on the same machine doing pre-vis for the series. And when Seth was doing a promotional commercial that was a tie-in between his film A Million Ways to Die in the West and Ted, we did a couple of mocap sessions for that. During production on that commercial, the system was being unloaded from a truck (I wasn't there) and was dropped off the back and onto the sidewalk. The monitors shattered, but the BOXX made it through just fine, with one little scar from the event. We've never had it serviced and it has been working in all sorts of terrible locations since 2011. I'm just amazed by its durability!

Discuss the future of your work and if you see BOXX as being part of that future.

The tools for CG have evolved and gotten more user-friendly, for sure, but the learning curve is steeper. The advances mean that there's just more to know. You have layered innovations upon innovations. Overall, entry-level CG is more accessible. But for the big, challenging stuff, be it feature films or 360/real-time/VR, the complexity just keeps getting raised. It's no longer "live action background with CG creature", rather it's "photoreal city with dynamic camera and digital double constrained to moving vehicle driving XYZ different simulation packages."

And sadly, the majority of consumer-level machines have been dumbed-down for the masses, made so that the UI is pretty, but inside it's gutless. Or rather, the tools aren't there to produce, they are media consumption devices. In other words, many machines to view beautiful images, but very few that can create them at a high level. It's a weird time!

Editor's note: Since this interview, Webster has purchased his own BOXX APEXX 2 3402 workstation featuring an overclocked, eight-core Intel® Core™ i7.

CGSociety referred to you as "a true master of the art of mocap." That sounds accurate, but for business card purposes, I'd suggest "Mocap Master." Do you feel like you have this process mastered or, in your mind, is there always more to do and learn?

I am definitely NOT a "mocap master." I have been on the user end of mocap for a long time and of course I have a lot of experience specific to the Ted films and the Xsens/MVN system, so there's that. If you were to put a pile of optical mocap cameras in front of me and ask me to set-up a volume I would be helpless. I'm an animator benefiting from innovations in hardware and software that make mocap more accessible. ■





BOXX GOES DEEP

In the spring of 2017, BOXX acquired Cirrascale Corporation, a premier developer of multi-GPU servers and cloud solutions for deep learning infrastructure. The acquisition enabled us to add Cirrascale's deep learning hardware to our line of multi-GPU solutions, solidifying BOXX as the leader in multi-GPU computer technology. As an added bonus, Cirrascale Cloud Services will continue to provide GPU-as-a-Service, enabling customers to load their own instances of popular deep learning frameworks like TensorFlow, Caffe, MXNet, and Theano. This provides deep learning and HPC application users with access to the raw horsepower of a modern multi-GPU system.

Multi-GPU workstations have always represented a significant portion of BOXX business, but as we continue to add enterprise customers like broadcast networks and organizations focused on deep learning, the acquisition of Cirrascale was a natural fit. BOXX will manufacture the high performance rackmount systems featuring up to eight NVIDIA® Quadro™ or Tesla™ graphics cards.

"Cirrascale is instantly recognizable as a leader in deep learning infrastructure, cloud services, and like us, is a strategic partner of NVIDIA, so naturally, we're proud to add them to the BOXX family," said Rick Krause, BOXX CEO. "Our customers now have a complete solution of world-class deep learning servers, development workstations, and cloud services for data scientists and researchers."

"With expertise in the development and manufacturing of high-performance systems, BOXX will now deliver deep learning solutions to customers worldwide while providing services and support to meet their needs," said PJ Go, CEO, Cirrascale Cloud Services. "This enables our team to continue to expand our cloud services. With BOXX, we'll further accelerate the ever growing momentum of machine learning and artificial intelligence."

For more information on BOXX deep learning solutions, visit www.boxx.com. To learn more about Cirrascale Cloud Services, call (888) 942-3800 or visit www.cirrascale.cloud.



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