

Detroit BOXX City



Vehicle designed and built by Marc Mainville

When presenting VRED automotive design software, Autodesk's James Cronin rides with renderPRO - By John Vondrak

When I speak to James Cronin, his latest news is that he is back in Detroit, a city you won't find on many "preferred destinations" lists. In fact, most of today's press reports regarding the Motor City read like autopsies, centering on a once great metropolis that has fallen on hard times. There's always talk of a resurgence, but it is slow getting underway. Despite all of this, for an industrial designer, car guy, and family man like Cronin, Motown sounds like home. He lived here for over a decade when he studied at the College for Creative Studies, followed by a job (right out of school) at General Motors as an Autodesk Alias modeler. From there, he went to work for Alias Wavefront, traveling to car design studios as a consultant and Alias training provider. His last stop was in San Diego, working for a major Japanese automaker, beginning as a concept modeler and departing as the visualization lead. The father of two children, Cronin likes the idea that he and his family are back in Michigan where his wife grew up and her family still resides. "The summers are great," he adds.

If it sounds like James Cronin is, in effect, getting back to his roots, it's true. It's even more apparent when he describes how good it is to be working again for Autodesk—especially since their acquisition of PI-VR, the German software company and makers of VRED, a series of software applications that streamline the car manufacturing process through sophisticated, real-time, visualization techniques. Autodesk is integrating VRED technology within its own existing lineup including Showcase, Alias, Maya, and 3ds Max. "For the past nine months, I've been using the world's best visualization tools," says Cronin, "and that's pretty exciting."

VRED Products

- VRED (for product designers) allows users to visualize 3D models on the fly.
- VRED Design (for automotive) enables users to review and evaluate design ideas in real time.
- VRED Professional (for automotive) provides high-end visualization and virtual prototyping to analyze 3D models.

The VRED Advantage

Although VRED users have expanded to include virtual photographers and other industries (in particular kitchen equipment and machinery for factories and manufacturing plants) it is still an automotive-focused visualization tool featuring real-time ray tracing courtesy of a CPU-based ray tracer. And because VRED is CPU-based, it can accommodate large data sets (as opposed to other visualization software which is GPU-based). "In terms of automotive design, that's one of its major strengths," says Cronin. "We can pull in data sets right out of team center as a JT file (the 3D data format used for product visualization, collaboration, and CAD data exchange) and we don't even have to clean it up. We don't have to do any backside culling. You just bring it right in, the whole part, and save all that prep time." This is critical to Cronin since he admits when working in visualization, most of his time is spent preparing data. He sees time savings as the true advantage of VRED.

"I would spend days preparing it so that I could spend one hour painting it up and hitting go for a turntable," he says. "The benefit of VRED is that you don't have to spend all that time preparing data. You can bring everything in to render and the ray tracer doesn't care. You have all that RAM. With the graphics card, you have limited RAM." But that doesn't mean VRED, which has its own unique rendering engine, is strictly CPU-based. It can also rely on the GPU for OpenGL rendering. "I met one customer using VRED in an immersive mode," says Cronin. "It had to be run on a graphics card at that point because they didn't have a large CPU cluster. It's performing very well for them—forty million polygon data sets running on a single graphics card in 3-D. When it's in ray trace mode, it's actually very fast. Comparing it to Showcase running on my laptop, there's a huge speed increase. When I installed VRED for the first time and got it running, I was shocked at how much faster it was. I don't know the actual numbers, but to me, it seemed four times faster than Showcase."

One of the reasons Autodesk made the decision to acquire PI-VR (and VRED) is because VRED is very much a cross-functional tool with a very broad range of uses, as well as a strong appeal to a certain type of user. “Most would probably fall under the category of a designer that needs to make a marketing level quality rendering and do it quickly,” says Cronin. The reason, he explains, is that throughout the world, the bar has been significantly raised when discussing the turnaround time and quality of rendered images. High fidelity visualization, or experiencing reality as close as possible before a product actually becomes real, is becoming more commonplace thanks to CPU-based rendering capabilities like those found in VRED. As a result, expectations are higher and Cronin admits that senior managers and executives have become more difficult to impress. “Perhaps ten years ago, if an image included reflections, they were blown away by it,” he says. “But now everything has it. Now it’s about how good it looks and how fast you can get there.”

Our discussion also revolves around achieving photorealism earlier in the design process in order to make decisions. Design managers prefer renders be as realistic as possible, alleviating confusion in regard as to what has been designed. “The old days of thumbnail sketches with a lot of chalk are really cool,” says Cronin, “but back then, an executive could indicate one aspect of the design and ask, ‘What is going on back here and you might say ‘I haven’t figured that out yet. Renderings are able to do that too, of course, but now, just as soon as possible, it’s important to get a photorealistic rendering of what the design is going to be because design times have shortened. The sooner you can demonstrate that your design is feasible, the more likely it is to be chosen or you’ll get the go ahead sooner.”

In other words, decision makers don’t have to rely so much on their imagination to fill in the blanks. They can easily see that design A is going to be the next Dodge Ram, Chevy Camaro, or Ford Mustang and say, “Let’s do that one.” Cronin explains that in the past, there would likely be eight design proposals with six of those selected to move on to the clay model phase. Three of these would then become full-size models, and of those three, one would be selected as the full-size car model. Nowadays, six proposals become two quarter scale models, followed by one full-size model. “One of the reasons the design schedule has been reduced is because they’re making the early ones so much more accurate,” says Cronin. “They have everything, like the ability to scan and mill right on the plate. In the old days, it was dragging templates and mirroring the car by hand in the clay. So it’s not just the digital process, the physical processes have sped up too. They’ve figured out a way to make everything faster and more streamlined.”

In addition to rendering, VRED Design and Professional are also instrumental for processes like validation and verification. For example, engineers may want to know what a particular headlight is going to look like in bright noonday sun. They may also want to see how that same light will look in a lit condition or how much light the LEDs are emitting. “These engineers don’t care about making a picture or rendering it,” says Cronin. “They just want to look at it for validation or to see what these interior parts look like when they are all together. In other words, how do they line up?”



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look at a virtual prototype of the auto body and determine if the surfaces were built correctly. This means they don’t have to build an actual, physical prototype of the car body and send it to surface analysis. Within VRED, they can accomplish some steps of the surface analysis process, saving both time and money.

For Cronin, one of the most unique VRED Professional features is its ability to ray trace the NURBS data so there is no tessellation—extremely critical in regard to lighting and reflection. “For a lighting simulation person, a half of a degree makes a huge difference on how a reflection or light actually bounces,” he explains. “The level of tessellation can affect the results, so if you’re using purely NURBS data and not tessellation at all, you don’t see the tessellation when you zoom in. It’s perfectly smooth.” Another benefit of VRED is that users of other Autodesk applications can easily bring those 3D formats into VRED and go to work.

On the Go with renderPRO

Though officially designated as a member of the Autodesk sales team, Cronin is actually the subject matter expert for automotive design, focusing on Alias and visualization. Most often, he splits his time between the Big Three automakers, accompanying sales personnel. “I go in and demo Alias, demo VRED, and answer questions,” he explains. “I do a lot of support as well since I’m on site so much. I get asked the instant question instead of customers putting a call into support.”

It was at Cronin’s last job (the aforementioned Japanese automaker) where he first became acquainted with BOXX Technologies by way of the four GPU 3DBOXX 8550 XTREME that sat on his desk. But now, in his new role as a demo expert, he travels with a 17” laptop manufactured by a tier one company. However, when Cronin needs to demonstrate detailed lighting, or any of the other features found in VRED, he brings along a BOXX renderPRO, the compact, dedicated rendering module featuring dual Intel® Xeon® processors and solid state drives. “It gives me workstation power without having to lug my workstation around,” he explains.

When Autodesk first acquired PI-VR and Cronin started working with VRED, he quickly learned that his laptop was woefully insufficient for demonstrating the software’s potential. Because of his previous experience with BOXX, Cronin went in search of a demo

solution and discovered renderPRO. “I was able to convince my boss to get me one, along with a nice little Pelican rolling case,” says Cronin. “Before, whenever I had to take my workstation, I’d also have to bring a monitor, a carry cart, and all that. It was a cumbersome process. But renderPRO is compact and easy to transport—and it’s even faster than my workstation!”

The speed of renderPRO is also critical since demonstrations require providing a wealth of information in a short amount of time. “When you’re presenting, you don’t have a lot of time,” says Cronin. “No one wants to sit and watch a full global illumination with photon map gather to one hundred percent. They want you to go on to the next thing. You have limited time to show off, so that’s where other guys have to lug the workstation in and say this is what you will get with your nice workstation. I just bring my laptop and renderPRO.”

VRED Design and Professional cluster very easily (they feature an offline and online cluster module) so for real-time ray tracing, while Cronin is interacting with the software, he can render frames for still images. When presenting, the real-time window on his laptop uses the renderPRO to power the ray trace, so he’s able to get very high-performance on the laptop without actually relying on it. “It’s great since I don’t know of any laptops out there with 32 cores or dual Xeons,” he laughs.

Was Cronin surprised the first time he used the renderPRO?

“Yes, it was so nice to see the status bar inside of VRED,” he recalls. Where it used to read eight cores, it now said forty. It added 32 cores! Usually, when you’re demonstrating high end, full global illumination, you rotate the vehicle and then wait for all the ray tracing to gather. With renderPRO, it’s nice to see it gather at an exponentially faster rate. It’s all about time to image. How fast can I get the best looking image without making mistakes? You need fast results and renderPRO allows you to make the right choice sooner.”

Cronin explains that one of VRED Professional’s strongest attributes is its ability to create simulation quality lighting imagery. “It’s like simulation level,” he says. “It’s not a simulation tool like some of the other ones that actually are, but it’s very accurate and I know the VRED team has conducted tests with actual production lighting and its 95-98%.”

However, in order to reach that level of realistic lighting, the calculations on the simulation (full global illumination, photon mapping, etc.) require a good bit of time. “You need it to proceed quickly,” says Cronin. “You don’t want everyone sitting there waiting and thinking ‘Is this going to happen soon? You just want to rotate around and hear everyone say ‘Oooh. You can’t have awkward pauses. That’s why renderPRO is such an important demonstration tool. The companies I conduct presentations for have high end workstations, so you want to demo with hardware that is similar to what they have on their desks.”

As much as Cronin appreciates the power and performance of renderPRO, he loves to talk about its mobility as well. “Sometimes I go to trade shows,” he explains, “and standing on the show floor I want to be able to show off this high end software, but we just have our laptops. It’s great to be able to throw the renderPRO in the little cabinet under the table and then I’m networked right into it. It works really well and, once again, I’m not forced to cart all that equipment to and from the show. If I’m traveling to California for a trade show and I call Autodesk and ask “will you have high end workstations for me to work off of with all the software loaded, usually the answer is no. You have to bring your laptop and that’s another reason why renderPRO is so perfect. I can bring it with me and stow it in the overhead compartment on the flight.”

According to Cronin, renderPRO’s mobility also makes it ideal for working from home. “When I’m at home, I’m able to cluster my workstation with the render pro,” he says. “Now I have the power of two workstations without



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actually having to own two workstations. It's also a smaller footprint on my desk and I'm not spending extra money on a graphics card and everything else that goes into a second workstation. At my old job, I had two workstations on my desk and when you start getting to the point where you need more rendering power you ask yourself if maybe you need a third workstation. You start to wonder what you're going to do, where is your monitor going to go? renderPRO sits right on top of my workstation and easily ties right into it—small footprint and quiet too."

Cronin also likes the fact that if you're working for a large company, renderPRO is an easier sales pitch to management and IT departments. "I don't have the restriction of going through IT personnel to install this," he says. "At my former job, hardware decisions came down to the corporate standard equipment. They were buying for people that were doing Powerpoint or Microsoft Word, assuming that that one particular workstation would work across the whole spectrum of 10,000 employees.

But when you're doing high-end design of any kind, you know you need professional workstation performance, including the right graphics cards. Unfortunately, when you start talking about that, you're doubling the price. If you get a high-end workstation with dual CPUs and an NVIDIA Quadro K5000, you could end up with a machine on your desktop that costs \$15,000. With renderPRO, it's a lot easier to say that all I need is this one small cluster unit for a fraction of the price and I'll be doubling my speed. It's also easier to justify by saying that you have to render this many frames by next week and that you'll be sitting here watching your computer do nothing but render for the next ten days or you can knock it out in four days. Speed and performance return your time back to you and that is the most expensive time for a company. You don't want your users just watching a status bar."

I remind Cronin that at BOXX, we often hear that our systems are expensive or that a particular company, though impressed with BOXX performance, is already entrenched with a mass-produced computer manufacturer. Cronin's response is simple: "If you're kicking off a giant animation on Friday, when you walk in Monday, you want to know that it finished on Saturday afternoon. My argument is always this: 'What's more expensive—someone sitting on their hands doing nothing or faster frame rates that equal greater productivity?'"

His logic makes perfect sense: save time, save money, increase productivity, increase profits. And since there are no substitutes for creativity, hard work, and common sense, if Detroit can hasten the return of more individuals like James Cronin, while retaining the like-minded souls who already reside there, perhaps the Motor City resurgence will get underway after all.



renderPRO

James Cronin has been an Alias Subject Matter Expert with Autodesk since July 2012. As a Subject Matter Expert, James's duties include helping customers by understanding their business issues and finding solutions that solve their challenges. James has over 14 years of experience in the Automotive Design Industry.



Prior to joining Autodesk, James was the Visualization Lead at Nissan Design America. Before Nissan, James was a consultant with Alias|Wavefront, where he worked onsite at many OEMs including GM, Ford, Chrysler, Honda, Mercedes and Hyundai. James graduated with honors from College for Creative Studies with a BA in Industrial Design.



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