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The DomeX Experience

A First-Hand Report

by James Hyder

As we have reported previously, [Cosm](#), the new parent company of [Evans & Sutherland](#), [Spitz](#), and [Live Like VR](#), has launched an Experience Center at the E&S headquarters in Salt Lake City, UT, that features the first DomeX system, a 66-foot (20-meter) 8K direct-view LED dome. The company invited the editor of *LF Examiner* to see the system in person in early April.

The DomeX demo installation is a vertically oriented partial dome with a field of view of 180 degrees laterally and 112 degrees vertically, about 70% of a full hemisphere. (It will also be available in a full 180-by-180 hemisphere in tilted or flat orientation, and in other configurations and sizes.) The resolution is 8,192 pixels across 180 degrees, with a pixel pitch of 3.8 mm, for a total image size of 29.5 million pixels. It is capable of 120 fps, and can display stereo 3D at 60 fps per eye with active glasses. The system meets the Rec. 709 color gamut standard and 92% of the wider DCI-P3 standard. (A version capable of the full DCI-P3 gamut will be available.) The dome's 7,970 LED modules are attached magnetically to the Spitz-designed framework, and, like the skins of

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Behind the Scenes of Stephen Low's *Train Time*

Train Time is the latest giant-screen production from the **Stephen Low Company**. It is a 5,000-mile-long journey from Chicago to L.A. via a southern route and returning along a northern one, exploring the world of giant freight trains and their crews. It opens with the memory of the model train toys of youth and then goes on a ride with the latest high-tech green locomotives that weigh nearly half-a-million pounds pulling trains up to a mile long. Now, climb aboard as *GS* veteran **Diane Carlson** goes behind the scenes with the films' director, **Stephen Low**, director of photography **Tristan Breeuwer**, and executive producer **Pietro Serapiglia**.

Diane Carlson: Stephen, anyone who chats with you for even 15 minutes will learn about your passion for trains. When did that passion get its start?

Steven Low: It started when I was one year old, really! My family lived in Montreal and my grandparents lived in Alberta, 2,000 miles away. And from the time I was one year old until I was 20, we made a family trip once a year to see my grandparents. And that trip was always via train; it was a two-day, two-night ride. And at that time, bolted tracks resulted in a special "clickety-clack" rhythmic sound that that was soothing — rocking you to sleep — and as a kid I loved it. Now, with more modern welded rail, this syncopated sound from my childhood is a fond memory.

I became a volunteer at the local railroad museum when I was 11 years old, and I still contribute to it today. In the 1960s streetcars and steam engines that were going to be scrapped were saved by the museum that is now called the Expo Rail Museum. We frantically laid track

every weekend to save our extraordinary railway history before it could be scrapped. Currently there is an expansion project that will include a new giant-screen theater and another large building to save equipment not yet stored properly.

When I was at university in the early '70s, I worked for the Canadian Pacific Railway as a switchman, trainman, carman, and brakeman on both passenger and freight trains out of Thunder Bay, Ontario. When I was 24 years old, I was offered a management trainee position with the Canadian Pacific, but I turned it down to pursue a career in film.

But I always wanted to make a railroad film from my earliest days with the railroad. I mean, the engines were so heroic, huge massive fast machines, perfect for IMAX. And since my father made films and was an IMAX film pioneer, of course I knew about the giant screen and dreamed of putting magnificent trains in their natural domain — amongst extraordinary epic scenery on the screen — for people and especially kids to appreciate. Lots of kids don't have the opportunities to travel that I had, but the giant screen can give them a perspective that even railroaders don't get to see; the aerials, to name one thing.

So being able to make *Rocky Mountain Express* and *Train Time* are dreams fulfilled for me.

DC: What were some of the challenges that you faced making *Train Time*?

SL: There are always technical and logistical challenges when you make any giant-screen film but for *Train Time* scheduling and weather were huge issues. The [BNSF Railway](#) network that we were working on

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L to r: Director Stephen Low with the IMAX film camera, and first assistant camera Philippe Prud'homme and key grip and master rigger Derek Teakle with the Sony F65 digital camera.

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was at full capacity; many times we just could not get the filming windows with the right light and weather conditions because the priority was for the freight to get through.

As filmmakers we want the best conditions and sometimes those are dramatic and dangerous. There was the winter sequence with an avalanche to name one. They would not let us into the avalanche zone at first due to safety concerns. The priority, of course, was to get the 80 backed up trains moving through the pass as soon as possible. So we had to wait three days before going to shoot. We got some great footage but we probably could have gotten even more dramatic big-screen shots had we been allowed access immediately. There were some shots that I wanted to capture that just weren't possible due to safety limitations.

There was one shoot that was all planned with an historic steam train on a special run for us, in the Columbia Valley in Oregon. It was supposed to be a secret operation. But the "secret" was leaked and what should have been fairly simple and straightforward shoot became complex

because the steam fans found out about the shooting and private cars lined the route adjacent to the line, with iPhones out en masse!

And the weather is always an issue. We were fortunate that one of vice presidents at BNSF also loved this steam locomotive, so he was of great help in getting the freight trains to yield the track to us. The freights had to wait for us, while we were delayed for weather, stopping to refuel the helicopter, or to reload film. It was challenging and tricky, but exciting at the same time. Given the logistics, it is amazing that we got the film made.

And there are always surprises, from avalanches and rain storms to bears and cows on the tracks. We had a close call with a cow, but fortunately we did not hit it. I recalled from my railroading days that if there are animals running down the middle of the tracks at night, turning off your headlight for a bit seems to help reorient them to move off of the track.

DC: What were some of the positive aspects of working with the BNSF staff?

SL: Aside from the scheduling challenges that were just a part of the reality of

filming a working railroad, it was great to be on these giant trains. And we were so lucky to have a filming train to ourselves for a month. Eight of us on the film crew stayed on the train: we had two sleeping cars, a dining car, and Warren Buffett's private car! The accommodations were very good; we even had our own chef! And the food was great. Given the physical challenges of the shoot – hanging on the front of a 70mph locomotive for 12 hours a day – that was very much appreciated. The rest of the crew stayed in hotels, had production cars, and followed alongside, including a fuel truck for the helicopter. There were a total of 16 people on the film crew.

It was amazing for me to see just how much the safety protocols had improved since the "medieval" 1970s when I had worked on the railroad. I'd say that they were increased 100 times over! When I had worked as a crewman it was understood that if you fell off of the train it was your fault! The film crew had a lot of safety training, and every morning of shooting began with a safety meeting led by BNSF staff.

And it was great working with the train crews; they were very excited at the idea of their work being featured in a film. These people work hard and often their work is not recognized or understood outside of their working environment. They have a passion for what they do. And they are key to keeping the supply chain moving in America.

DC: What is the one thing that you want people to understand about trains?

SL: That trains are incredibly energy efficient and getting greener every year. We need trains; they are part of the solution for our climate issues. Once trains can be electrified, with zero-emission hydro, solar, wind, or even nuclear power they will be fossil-emission free. Even now trains can move one ton of freight 470 miles on one gallon of fuel; that is the most energy-efficient way to move goods either over land or by air. They crush the competition on energy efficiency. Only a sailing ship is currently more energy efficient, and they aren't too practical.

People don't necessarily appreciate the

underlying physics of what makes trains so efficient. The key is the low rolling resistance of steel wheels on steel rails compared with rubber tires on asphalt. A passenger train can use as little as about one horsepower per seat. Jet aircraft can use as much as seven hundred times that per seat. Entirely unsustainable, if you ask me! We need to start understanding energy inputs at every level.

Thinking about this globally, look at what the Chinese are doing. They have undertaken huge railroad construction projects across Asia, into Europe, and in Africa. They understand that rail is the most energy-efficient way to move goods and people across land. And the land routes are often shorter than long sea voyages. Rail is also capable of converting to zero emissions with much greater ease than water, highway or air transport. Eventually they will be able to run with renewable energy like power from windmills. In theory, at least.

DC: I understand that you lent some of your toy trains to the layout that was built for the film. What does your collection include? And did you have “train time” at home when you were growing up?

SL: Yes, we had train time and I still have my little “American Flyer” that circled our kitchen when I was young. My distraction now is collecting live steam engines that actually run on steam. These are handcrafted 1:32 scale working engines. I started collecting in the '70s when there were only a few British models from the 1920s and '30s.

In 1975, a Japanese typewriter firm that was going bankrupt started producing model steam engine kits that you could assemble. They produced many of the ones with a great history, like the engines featured in *The Bridge on the River Kwai*, *Lawrence of Arabia*, *Dr. Zhivago*, and *Murder on the Orient Express*. I have all of those, plus some Chinese, Russian, French, American, and Australian ones. The largest one is the Allegheny, one of the largest steam engines ever built. This model is about four feet long. They have thousands of precision parts.

The Japanese and Chinese draftsmen and craftsmen do an incredible job not

only on the design but the complex instructions for the assembly. It would take me about a year working several hours a night to complete one of the kits. The collection tells a fascinating story of how steam engines shaped the world and how each country specialized its engines for local circumstances, industries, topography, and cultures. The art and engineering of the each engine tells a story, a really rich story. In their day they were the Space Shuttles or Formula One cars of their time. So, yes, I still have train time at home.

DC: Why did you make *Train Time*?

SL: I made *Train Time* in part because we need kids to be inspired about the world around them; after all, they are our future. Trains are a great vehicle to get them interested in science, engineering, and technology, not to mention social history, music, and even art. Think of all the kids who right now are playing with Thomas the Tank Engine or Brio trains. And the giant screen is so special; it's so much better than TV for educating and exciting people about a topic.

I was very lucky as a kid. I had experiences and access to things that kids nowadays just don't have.

When I was as little as four or five, I visited the cabs of locomotives, the cockpits of airplanes, and the wheelhouses of Great Lakes freighters with my father. He knew the power of a small child: “This little boy would like to see the cockpit.” I cannot recall ever being turned down.

The train yards were downtown in most cities and kids played on the tracks even at night! I'm not recommending that, merely suggesting it was a different world, not so ruled by lawyers and insurance companies. I loved watching how things worked, how ships were loaded and unloaded, how factories worked. Now days it's hard to get anywhere near industry, especially with children in tow.

I even got to watch molten hot Coca-Cola bottles being made. Many factories had tours for school kids. Kids no longer have as many of these kinds of hands-on experiences, but we can do the next best thing and bring them the experience on the giant screen.

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Filming the Southern Pacific “Daylight” 1940s steam engine with the IMAX camera for *Train Time*.



L to r: First assistant camera Philippe Prud'homme, and key grip and master rigger Derek Teakle rigging the IMAX camera in front of the engine.

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I think kids in school must be thinking “What can I do in the future?” There are many good careers in the rail business (and many others) and we show a variety of these in the film. We need to expose potential careers to kids, to show them what’s possible, to get them engaged and excited about the world they will inherit. Kids all want to go into space or even play in the NFL, but statistically that’s not a reality. Kids need dreams that they can work towards, dreams that can come true.

We also show that trains are getting greener and that they are much higher tech than people think. I hope that some children – both girls and boys – who see this film will grow up to help make trains even more energy efficient and zero emissions. Science is so critical now with global warming becoming the greatest challenge in human history and a threat to all life on earth.

I think the railroad, and all the efficiency that it represents, is a good intro into science and technology, and among the most fun. It is, after all, a journey across the wilderness, a trip you can actually take yourself with a simple ticket to ride, or even as a lifelong career. Short of that, after your little ones have grown up and left home you can pull that toy train out of the closet and get it running. That

might be the most fun of all.

My passion for the giant screen as an educational and inspirational tool drove me to make this film and, of course, many others.

Tristan Breeuwer joined the Stephen Low Company in 2009; this is his third DP credit.

DC: Tristan, what are some of the special challenges that you faced in filming *Train Time*?

Tristan Breeuwer: Safety was the number-one priority and that was a huge overarching concern for the entire project. This includes personal safety for all of the crew, and protecting our equipment and the train as well. Due to its massive size, the train is something that people who aren’t involved with the shoot might not even think about. We had to take particular care not to even rub the orange paint on the locomotives with our rigging! So you are building frames out of pipes – maybe 100 feet of pipe of all different lengths from two feet to ten feet – and attaching them together to the train with clamps, straps, and suction cups. Just think about Stephen’s classic coming at you head on engine shot. What does it take to do this? Well, you need to have the IMAX camera about five to six feet out in front of train. That is a lot of weight sus-

pending on rigging that you can’t drill into the frame of the engine to secure. And it has to be rock steady. For this shot we had a wired remote to the first camera assistant who was in the cab of engine.

As we made our way along the track, nearly every day we had a new safety coordinator who we would meet with each morning. They were the experts for their section of the line. On one occasion we wanted to capture two trains rushing past each other from the point of view of the engineer, as if looking out of the window. Leading up to the cab there are a set of steps and we rigged our IMAX camera to be there. The limit that the camera could protrude out was ten inches: those trains really are close to each other when they pass.

So we got the shot. The train stopped and we got the camera off, but left the rigging on the train, waiting until the end of the day to take it off. Then we went over an old bridge that had less clearance. The coordinator, having focused on the distance between the two trains, had forgotten about a few older bridges along this section of line that had slightly narrower clearances. We lost the rigging! Thank goodness we had taken the camera off or we would have lost it, too. The train was not damaged, and that was good, too.

At the other end of the rigging challenge was setting up to get the photos at track level; we used some digital cameras there because the clearances were so tight. For any shots taken from the train vibration is the issue, and the work of the rigging team was incredible.

We also used helicopters, as well as a 20-foot crane with a Sony Venice camera in the hump yard in Kansas City.

DC: What about other new experiences in the making of *Train Time*?

TB: While Stephen had grown up with model trains I had not, and I was in charge of designing and getting the model train layout built. That was a lot of fun because I could build it with the shots that I wanted in mind. We wanted a very dreamy feel for the recalling of memories of playing with a model train layout. So we chose a highly reflective surface for the layout, which was unusual. While the layout was built from scratch, we borrowed

many of the buildings, and the “working” trains were from Stephen’s collection. It was my first time working with kids on a shoot and that was very difficult. The kids were great but they were not professional actors; they were very interested in the filming and kept looking at the camera. That short sequence took three days to shoot.

DC: How long is that sequence in the film? How did the children react to the fog in the shot?

TB: The final running time of the shoot is a little over two minutes. And the top half of the “fog” is digital. It was added afterwards in part to boost the effect, but also to hide the ceiling tiles that would be distracting that were in the room we were in.

DC: What are some of your favorite shots that are in the movie?

TB: There are so many! I love ones that give you the sense of being in the locomotive with the point of view of the engineer leaning out of the window. There is a shot in a snow shed that I really enjoy because of the pattern of the light and shadows. And of course, the wide shots in 15/70 are incredible. But one that I really like is the 15/70 shot of entering Seattle: the city is in the distance, the port with the water and cranes are to the left, you see the tracks taking you into the city. All of the detail and all that is going on in that shot is fantastic.

Pietro Serapiglia is producer and head of distribution for *Train Time*.

DC: Pietro, you have worked for Stephen on 18 giant-screen films, sharing the title of producer on 17. What was new to you on this production? Any new insights?

Pietro Serapiglia: From my *Rocky Mountain Express* experience I know that audiences love the giant-screen ride on trains through incredible landscapes. But as a Canadian I was well aware of the story of how the Canadian Pacific united eastern and western Canada to build our country.

Now, with *Train Time* I got a completely new insight that as a consumer I had never thought about. Whether it is my breakfast cereal, the grain for my bread, or even my car, they all traveled by train to

get to me. Also, I had never seen the great “middle” of America and the vast landscapes, including deserts and agricultural land, are pretty fantastic.

From talking to friends and family about trains, I have been reminded just how much kids love trains, and once again, “Uncle Pietro” gets to work with trains. I really scored points with my family when two of my grand nephews and a grandniece got to be extras in the film! And, of course, I love music so that part of any film project is always very special for me; there is a great collection of train related and inspired music.

I think that Americans will be impressed with the railroad employees who work hard 24/7 to keep the supply chain moving. And one other thing: I never knew that there were women working as train engineers! That was totally new to me. I did not see that when we filmed *Rocky Mountain Express*. In fact, women work many different roles in the railroad industry and the largest freight rail system in North America (and our film sponsor), BNSF, just promoted a woman, **Katie Farmer**, to be president and CEO; she started as a railroad trainee right out of college. I know that science centers are interested in promoting non-traditional science and engineering jobs to young girls and in *Train Time* they will see women

working on the railroad. This is something that they probably never even thought about as a career option.

I also saw once again how Stephen’s true passion for trains got this film made. He understands and loves trains of all kinds, from collector’s models to the giant steam engines of the past to the high-tech trains of today. He could talk “railroad talk” with the management, but also with the on-the-ground workers. It did not hurt that he, too, had once worked on a train.

Even after 30 years in the GS world I still get excited when I see our images on a giant screen with incredible surround sound, and I hope that theaters are soon able to welcome back guests to their theaters to board *Train Time* and the other great films that so many people have been working on for the past year.

Train Time will be released in the summer of 2021 in IMAX digital and laser and DCI-compliant formats. For more information, visit www.stephenlow.com

Diane Carlson is principal of Giant Screen Cinema Consulting. Before founding the firm in 2017, she managed the IMAX theaters at the Pacific Science Center in Seattle, WA, for over 35 years. She can be reached at dianecarlson-gsc@gmail.com.



The Train Time film crew in the dining car.