Title:
Elevating Traffic Animations Without Breaking the Bank

Date:
April 1, 2017

Word Count:
1232 words text + 5 pictures/table/figures x 250 words (each) = 2482

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1   *Abstract*
2   When municipalities are unfamiliar or uneasy about incorporating complicated design concepts
3   and strategies into a community or local network, seeing a working traffic simulation model
4   (Vissim) can ease the anxieties of the client or project stakeholder/public. The model environment
5   along with vehicle interactions provides the validation of a project design. But, what do you do if
6   your existing conditions or alternative designs have large cut or fill sections along the roadway,
7   traverse through rolling our mountainous terrain, or need realistic nighttime or dawn/dusk lighting
8   conditions?
9
10  Bentley Lumen RT and/or ConceptStation combined with MicroStation and the Vissim ani.txt file
11  can provide a robust 3D cinematic look that includes proposed terrain and cut and fill areas. This
12  method can render proposed interchanges or areas with rolling and mountainous topography.
13  Lumen can be more cost effective than 3DS Max by requiring less conversions, as LumenRT
14  automatically recognizes MicroStation material for quick roadway renderings. Many DOTs use
15  Bentley software so this process keeps everything in the same software saving time and
16  conversion headaches. Swaying trees, buildings via SketchUp, and parked cars can be inserted
17  into LumenRT with similar time needed to place 3D elements within Vissim 3D. Other features,
18  such as moving clouds, day/nighttime lighting, water, and additional moving cars/ pedestrians can
19  be quickly added to enhance the 3D environment.  The entire 3D world can be shared and viewed
20  at any angle via LumenRT's Live Cube.

1   *Introduction*
2   When municipalities are unfamiliar or uneasy about incorporating complicated design concepts
3   and strategies into a community or local network, seeing a working traffic simulation model
4   (Vissim) can ease the anxieties of the client or project stakeholder/public. The model environment
5   along with vehicle interactions provides the validation of a project design. But, what do you do if
6   your existing conditions or alternative designs have large cut or fill sections along the roadway,
7   traverse through rolling our mountainous terrain, or need realistic nighttime or dawn/dusk lighting
8   conditions? The answer can be as simple, or complex, as developing a 3D model.
9
10  *Setting*
11  Why should we develop a 3D model? As engineers, aren't we only interested in the analysis,
12  hitting calibration parameters, and getting results?  Who cares how the model looks if we get
13  what we want out of it?  The public, and some clients, are very sensitive in how models look and
14  question some of the most minor details that don't impact the overall analysis. If your model
15  does not look believable, then there may be doubt in what your model represents. A 3D world
16  needs to be an appropriate representation of the story you want to tell. Would a default 2D
17  ground plane makes sense to show stakeholders? When considering decision variables such as
18  these, there are also the following to consider: the audience, the type of existing & proposed
19  terrains, structures such as bridges, and ultimately the budget. Other factors that may be
20  important to the target audience such as different lighting condition's (sun glare, nighttime,
21  tunnel lighting) or weather conditions (fog, rain, snow). New capabilities with updated software's
22  now incorporate environments and weather so you can see what your project looks like.
23  Stakeholders, clients, and even our own project managers love seeing a real-world "looking"
24  replications. A 3D model is a better communication tool and it re-enforces your alternative will
25  work in all dimensions

26  **Figure 1: 3D Traffic Animation**
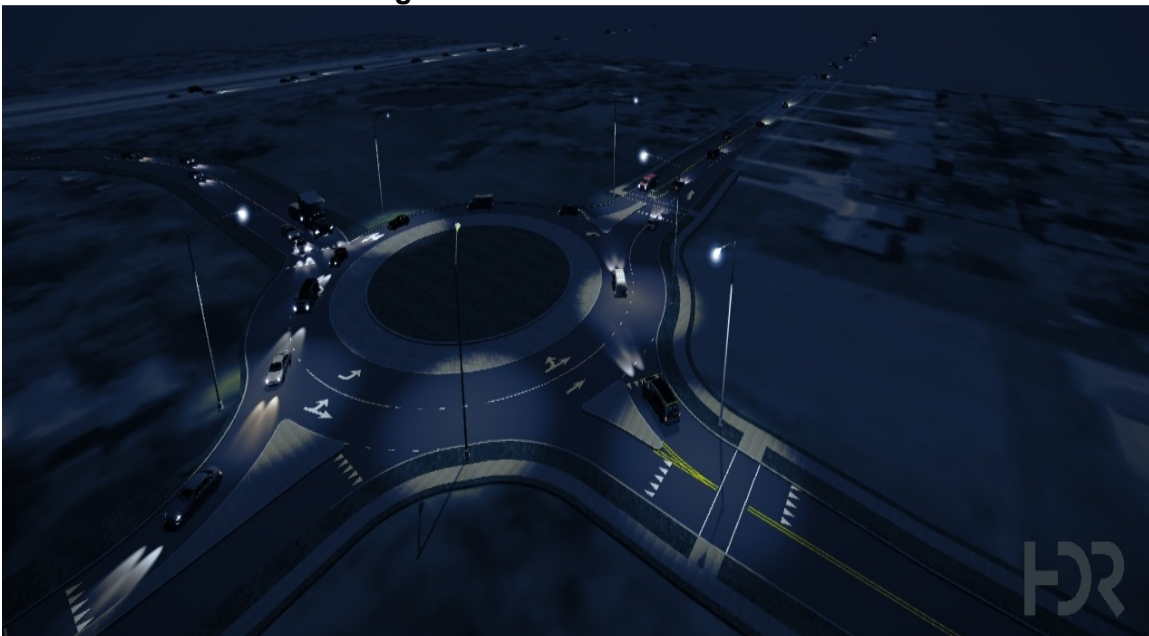


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29  *Challenges*
30  Often the biggest challenge is the budget; 3D can get expensive. Planning in the earliest stages
31  of the project will reduce cost when done properly. Early definition of decision variables and
32  assigning key elements is a step in the process that will save time later. Focusing the model

1   attention to a specific area is key. Do you need to see a 3D model of an entire city? The target
2   audience will mostly be interested in areas that effect their everyday travels. Pin-point these areas
3   of interest and focus the modeling to a specific target.
4
5   Another challenge includes accurately placing your Z-elevations to avoid the "flying car" affect
6   and working Metric/Imperial unit conversions between the traffic model to CAD. A traffic model in
7   Vissim always have x,y,z points in meters regardless of the network settings. You need to figure
8   out where your information is coming from, what the coordinate system is, and what are the
9   working units. An example of this affect can be seen in Figure 2 below.
10
11                                           **Figure 2: "Flying Cars"**



12
13  Choosing an appropriate 3D software can also be a challenge. The top tier, most expensive,
14  software being used for high quality 3D traffic animations is Autodesk 3DS Max. 3DS Max has
15  been the high-end 3D software go to for years. However, this can be very time consuming and
16  is often cost prohibited. Typically, these types of 3D traffic animations will be done by a
17  specialized visualization group either in house or as a subcontractor. An example of this
18  software can be seen in Figure 3.
19
20  SketchUp is another option but the quality product can be low. The same methodologies apply to
21  both software's requiring key frames in Vissim and a run model with recorded animations.
22  Sketchup terrains with aerials can look too basic where surfaces are often simplified. Most traffic
23  modelers are familiar with this as it is quick, easy to implement, and can be cost effective. An
24  example of a SketchUp + Vissim 3D mode can be seen in Figure 4.

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**Figure 3: 3DS Max Example**



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**Figure 4: SketchUp + Vissim 3D Mode Example**



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8  *Approach*
9  Bentley Lumen RT and/or ConceptStation combined with MicroStation and the Vissim ani.txt file
10 can provide a robust 3D cinematic look that includes proposed terrain and cut and fill areas. This
11 method can render proposed interchanges or areas with rolling and mountainous topography.
12 Lumen can be more cost effective than 3DS Max by requiring less conversions, as LumenRT
13 automatically recognizes MicroStation material for quick roadway renderings. MicroStation
14 layouts and tins are applied as surfaces using level information and Lumen information. When
15 using Vissim, the spline points on each link need minimal spacing to provide a high resolution to

1    sit on top of the tin. You must maintain the same coordinate systems and units between the
2    different software. By doing so, you can rip apart the Vissim files and find all the Z-elevations from
3    the Vissim XY-coordinate plane. After a Vissim simulation, you use the ani.txt file to get the
4    locations of the vehicles from the animation and that is imported directly into Lumen. Finally,
5    Lumen will use a script to translate this vehicles information into Lumen vehicles.
6
7    Many DOTs use Bentley software so this process keeps everything in the same software saving
8    time and conversion headaches. Swaying trees, buildings via SketchUp, and parked cars can be
9    inserted into LumenRT with similar time needed to place 3D elements within Vissim 3D. Other
10   features, such as moving clouds, day/nighttime lighting, water, and additional moving cars/
11   pedestrians can be quickly added to enhance the 3D environment.  The entire 3D world can be
12   shared and viewed at any angle via LumenRT's Live Cube (Figure 5).
13
14                              **Figure 5: LumenRT Live Cube Example**
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