



Engineering for the Universe Inside the Metaverse

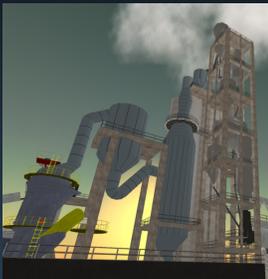
## FORMER SLENGINEER MAGAZINE

RENAMED IN RESPONSE TO NEW TOS IN SECOND LIFE

March/April  
2008

Volume II  
Issue 2

FLSMIDTH  
BUILDS  
VIRTUAL  
PLANT IN  
SECOND LIFE



## MAPS



VIRTUAL  
CONTROLS  
FOR THE  
REAL WORLD

# TEEX BRIDGE TOUR



Dear Readers,

I am writing to call your attention to a few changes that we have made at the magazine. First of all, in response to recent changes to the terms of service for the use of a Second Life account, the publishers for the SLEngineer magazine made the decision to change the name of the publication to Grid Works. Over the next month, all branding, images, Web sites, and other related media will be updated to reflect this change.

Overall, we feel that the new name will more adequately reflect the magazine's goal of documenting and reporting how companies and people are using online services and tools to support and enhance their work in engineering and science-related fields.

Another change that recently occurred was that due to real life commitments, MarcusSRB Raymaker has moved from co-publisher to contributing editor. Dave12 Kline, a registered professional engineer with the department of transportation in Illinois, will assume the duties of co-publisher.

Finally, Grid Works will be busy over the next month changing out SLEngineer kiosks located in Second Life to a new kiosk reflecting the name change. The new kiosks will also be scripted to distribute the magazine in-world in addition to providing a link to the journal's online edition. We think this will allow for more choice of delivery for our readers and will also help alert readers to the availability of new issues. If anyone is interested in obtaining a kiosk for their land, please send me an IM or e-mail me at [civile@gwjjournal.com](mailto:civile@gwjjournal.com).

In May, our magazine will be a year old, and so we want to take the time to thank all of the readers who have read our publication. We believe that these changes will help us deliver an even better publication that will continue to provide our readers with new and innovative ideas that help bridge the gap between our real lives and our emerging lives on the grid.

Sincerely yours,

*Civile Writer*



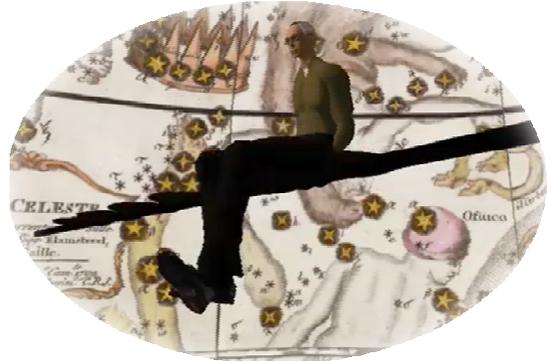
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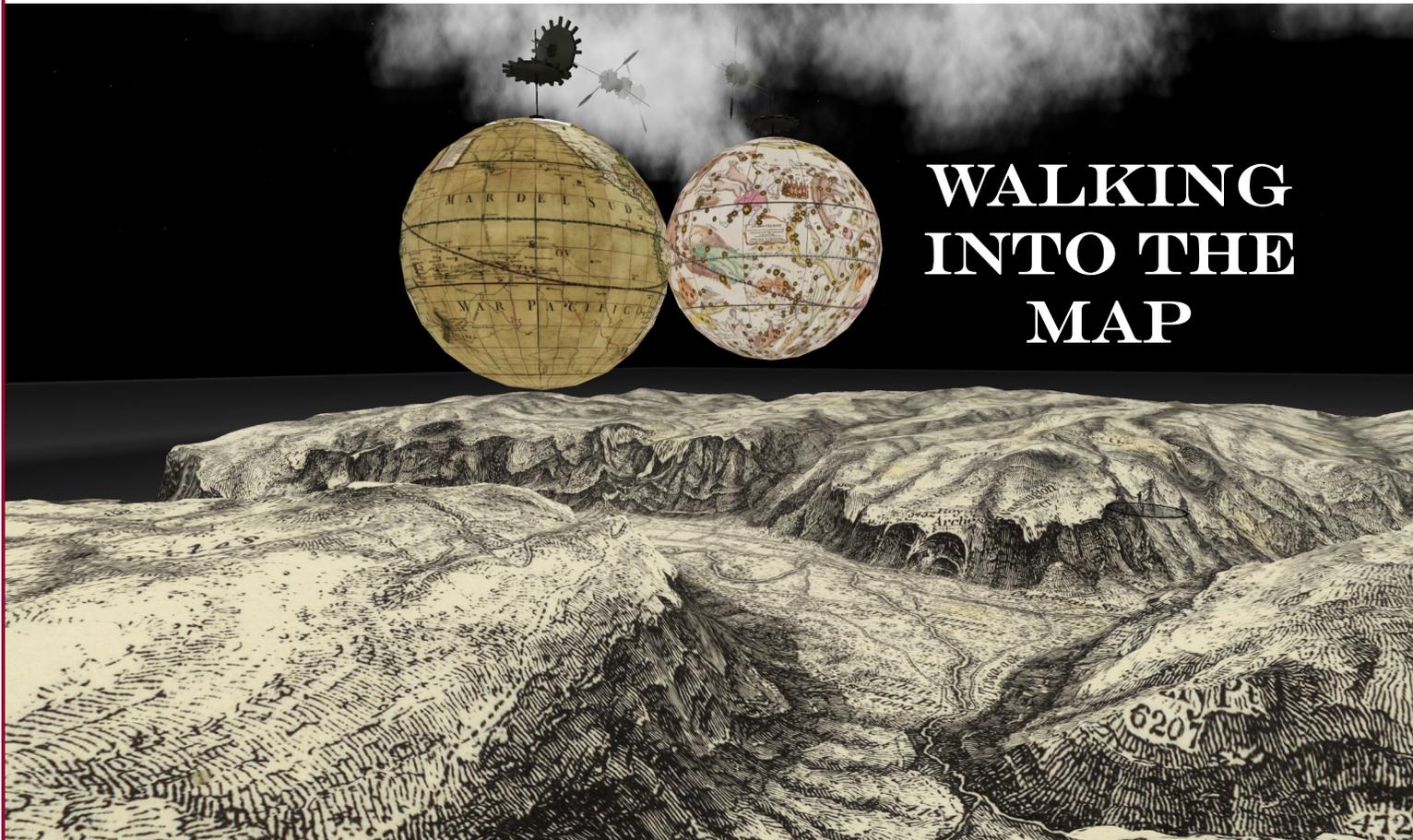
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# WALKING INTO THE MAP

There is always that one show you watch as a child that ends up making such an impression on your young mind that the images and feelings the show creates stay with you all of your life. For me that show was about a man who kept looking at a painting, wanting to go into that picture, and then at the end of the show finally did—he walked right into the painting hanging on his wall and never came back.

I have never found a painting yet that made me want to walk into it, a painting for which I would leave my real life. And as tempting as Second Life is, I still gladly leave it to return to the physical world. But I have to admit I have been tempted by some maps. Particularly the older ones with the scrolling borders, handsomely illustrated text, and, of course, the fearsome-looking sea creatures lolling about the world's oceans waiting to devour the next hapless ship of sailors.

Perhaps because I am a contemporary map maker myself, I have become more susceptible to the allure of maps. So imagine the delight I experienced when I teleported to Rumsey Maps—four sims dedicated to the presentation and sharing of maps—and landed in a map. This incredible display is all thanks to the vision and generosity of David Rumsey, a man who has spent 25 years collecting 150,000 maps of our universe covering the time period spanning from the 1700s through the early 1900s.

In the 1990s Rumsey began placing his collection online with images developed from scanning the paper copies at a high resolution. By 1999, there were 2000 maps online for access by anyone with an Internet connection. "This changed everything about my work," said Rumsey. "I became the proprietor of a virtual library." Today there

are over 17,000 maps online. "It is highly unlikely that you would ever see these maps in their paper forms. They are too rare and way too fragile. But anyone can now explore them at will and get to know them intimately."

**"I can walk on the maps and get to know them in a whole new way"**  
**-David Rumsey**

Rumsey's Web site at <http://www.davidrumsey.com/> offers several tools for viewing his collection and for creating presentations and slide shows. Georeferencing of the historic maps has allowed for the ability to add modern-day GIS data to the historic maps. Users can compare and overlay maps of the same area from different time periods using tools that fade one map into the other.

And with Second Life, Rumsey now has the opportunity to share his maps in a completely new and unique manner. In describing the creation of the Yosemite map that overlays the entire four-sim area, Rumsey said, "We used hatching to indicate cliffs and were able to georeference the map and combine it with digital elevations. Using gaming software, we created a 3-D view of the Yosemite Valley to disseminate it over the Web site. Then we put it into Google Earth. Then we did what we see all around us now. We brought this entire map into Second Life where you can fly through it."

In addition to the large map of Yosemite, the Second Life map collection includes over 50 maps, viewers, and globes that you can take for free and pass around to others. There are spinning globes of the world and historic maps of London, Paris, New York, and many other localities.

As Rumsey said, "I can walk on the maps and get to know them in a whole new way." And now, thanks to Mr. Rumsey, I can walk "into the map" too. ⚙️

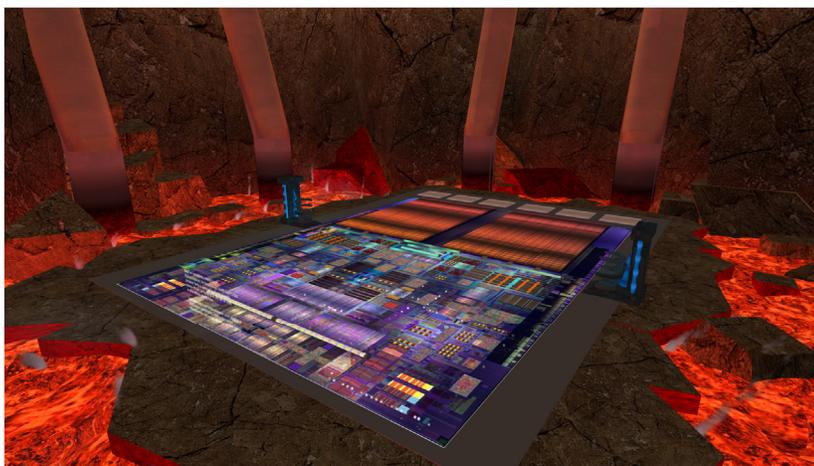
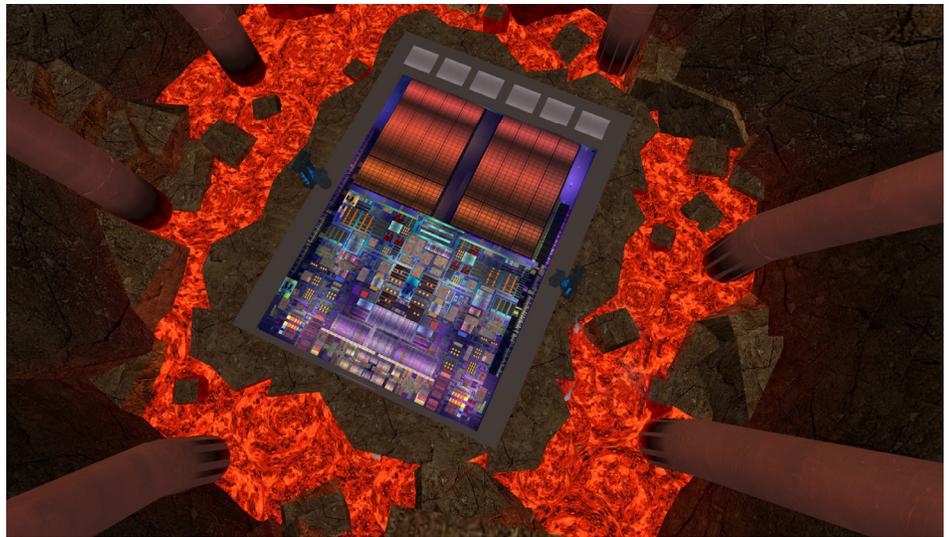
## YOU GOTTA SEE THIS!

The editors of Grid Works are exploring the grid looking for engineering- and science-related builds that may interest you. If you have a build that may appeal to our readers, send a brief description and photo to [civile@thegridworks.info](mailto:civile@thegridworks.info).



Little did the sunflower-planting avatars know that beneath the pastoral setting of the sunflower field on Intel Island churned the inner workings of an Intel Core 2 Duo processor lying within a lake of lava.

Access to the inner core is found through a teleport station within the building near the sunflower field. Visitors can reach the processor and lava lake by choosing "core" from the teleporter menu.



**Now we know  
why our laptops  
get so hot!**

# Bridge Maintenance Tour



The Bridge Maintenance Course offered the Texas Engineering Extension Service (TEEX), a member of the Texas A & M System, trains public works employees how to perform bridge inspections and maintenance operations—two tasks vital to ensuring the safety of our nation’s bridges. So when TEEX discussed creating a build in Second Life to support their existing training programs, staff members thought a bridge maintenance tour may be a good start. “We wanted to make something that would be of real benefit to those that would visit the build, and could be of interest to a variety of visitors,” said James Matney, project manager for TEEX—also known as TEEX Clary in Second Life (SL). “Because of recent incidents within the U.S., we thought providing information on common bridge concerns would be a welcomed build.”

Because TEEX has six other divisions with training in related areas, the staff had considered other types of builds. “Initially there was the idea of creating a virtual version of our famous Disaster City and Brayton Firefield training areas,” said Matney. “These would have potentially provided some aspects of virtual training in search and rescue, and firefighting. Also, it would have allowed for a virtual tour for these often ‘off-limits’ facilities. But, the fact that TEEX’s entry into SL coincided with the creation of Public Works island presented an ideal opportunity for TEEX to contribute to what is already a great fixture in SL.”

**“It’s only a matter of time before we shift our SL walk into an SL jog.”**

-Jay Socol, communications director, TEEX

## CONSTRUCTION BEGINS

TEEX Clary began construction of the Bridge Maintenance Tour in October 2007 on the Public Works sim, an island in Second Life established to provide a resource for public works professionals and engineers. “This is TEEX’s first build, and the bridge is convenient in its relative simplicity,” said Matney. “Building the bridge was a learning process that started with large prims. Then development of the

informational station podiums provided for some experimentation with basic sculpted prims and scripts for interaction. I can see future builds being more complicated, detailed, and interactive, whether we develop more skills in-house, or by outsourcing to professional developers.”

As Matney planned his SL build, he faced the initial frustration felt by most who are familiar with popular modeling programs—there is currently no easy way to import CAD files into SL. “First, we planned to use a previously developed 3-D model of a newly built local bridge as a benchmark for the build, but we did not have an easy way to import the model. However, the bridge’s parts were very simple to rebuild in SL.”

Once the bridge was in place, Matney started to place information stations at specific bridge elements. “We used our Bridge Maintenance flier for content,” said Matney. “When we had a couple stations ready, the bridge was reviewed by our bridge maintenance expert, Ralph Banks, P.E., TEEX adjunct instructor for bridge maintenance.”

Banks made sure that specific components were focused upon. "Examination of a typical roadway bridge structure for maintenance issues usually requires a methodical and relatively comprehensive on-site, sequential examination for maintenance needs of the bridge's various components and their parts which are referred to as elements," said Banks. "Most bridges consist of deck, superstructure, substructure, approaches and channel components, with many different maintenance issues possible within each component."

Matney and Banks decided to use a notecard distribution system to convey information. "To develop the information, Banks reviewed a slideshow presentation with a number of the core bridge maintenance issues," said Matney. "From there we tried to incorporate as many of the reviewed issues as possible. Most of the stations include a button that demonstrates what needs to change in order to keep the bridge best maintained."

### FINAL REVIEW

After Matney completed the build, Banks provided a final visual review. Matney said, "He suggested corrections in some areas, including slight changes with the bridge marker signage, and changes in the bridge's drainage to make it more authentic and applicable for what it was intended to demonstrate."

Communications director, Jay Socol, provided a final review of the notecard information. Once those text changes were made, the bridge was officially "open." Socol and Matney introduced the bridge maintenance tour sim to their public works director and some other folks at TEEX. "They asked a ton of questions, but not in a negative way," said Socol. "You could tell that they were trying to fully gauge the potential of this newly revealed tool. The wheels are twirling in their heads—it's only a matter of time before we shift our SL walk into an SL jog."

Socol would like to see the build generate interest in the real life course, "Routine and Preventive Maintenance of Bridges," that is offered by the Engineering, Utilities, and Public Works Training Institute (EUPWTI) division of TEEX through the federally funded Local



**TEEX Clary (James Matney in real life) sets out traffic control during construction of TEEX's Bridge Maintenance Tour.**

Assistance Program, or LTAP. "I want this information to reach new people. I'd like it to result in people taking our bridge maintenance course or investigating other training made available by TEEX," said Socol. "Internal to TEEX, I'd like our other operating divisions—fire, search/rescue, law enforcement, etc.—to be excited about it enough to seek our help in finding their own presence in SL. That's when I'll know we're succeeding."

Matney also sees the SL bridge tour as an opportunity for TEEX to participate in keeping people in general informed on concerns in their community. "We can also use the bridge as a guided tour of issues for county officials and engineers. Eventually, the bridge could be used within actual lectures and classroom training." 

## Texas Engineering Extension Service Offers Comprehensive Training

With over 100 years of providing vocational training, the Texas Engineering Extension Service (TEEX), based in College Station, Texas, has evolved into an agency that provides training in several locations in the areas of fire, homeland security, public safety and security, public works, safety and health, search and rescue, and emergency response. TEEX has also trained more than 210,000 emergency responders on behalf of the department of Homeland Security through its National Emergency Response and Rescue Training Center (NERRTC). Through its membership in the Texas A&M University System, TEEX is part of an overall organization that annually educates nearly 100,000 students, conducts \$500 million in research, and reaches another 11 million people through other services.

One of TEEX's facilities, Disaster City, was created as a mock community to simulate various levels of disaster and wreckage that can be customized for the specific needs of any group. This emergency preparedness training facility, located on 52 acres in College Station, Texas, has hosted training for groups from across the world.

Adjacent to Disaster City is TEEX's Brayton Fire Training Field, a 120-acre site that includes full-scale buildings, towers, tanks, industrial plant structures, and a ship—all available for life-like training simulations. TEEX's annual fire training school attracts more than 4,000 firefighters and emergency workers each summer for a week of intensive, hands-on training.

Nearby is also the 14,000-square-foot Emergency Operations Training Center (EOTC)—a state-of-the-art facility using simulation and computer-based technologies to train first responders and city officials to manage a crisis through a unified command approach.

Further training is provided at the Texas A&M University's Riverside Campus west of Bryan. There TEEX offers a circuit training exercise track for training Central Texas Police Academy cadets. Simulation prop houses are also available for tactical training and simulations. Additional facilities include a firearms range used for target shooting practice, an unexploded ordnance (UXO) range and search grid used to train students to identify and locate subsurface and surface UXO, an emergency vehicle driving rack used to help students safely respond to incidents by giving them hands-on practice, and a public works training hangar used to train utility workers in the electric power and telecommunications industry.

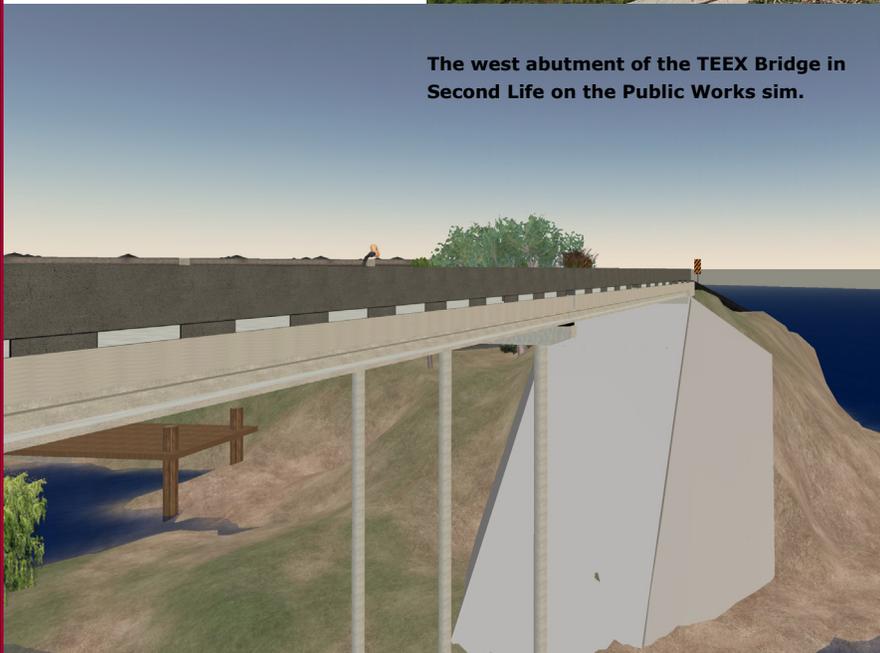
The Riverside Campus also is home to training in code enforcement, disaster management, heavy equipment operation, environmental hazards, highway safety, transportation, traffic control, and water and wastewater operations.

Training for those working in the maritime industries is offered in Galveston in a 12,000-square-foot center located on a 14-acre waterfront site. Another facility located in Mesquite is the site of the TEEX Professional and Regulatory courses and houses the OSHA Southwest Education Center. An additional campus is located in San Antonio and is the site of training for basic skills, safety, and technical knowledge for the work place. 

# THE TEEX BRIDGE



This real life bridge served as a model for the TEEX bridge in Second Life.



The west abutment of the TEEX Bridge in Second Life on the Public Works sim.

The TEEX bridge is SL is modeled after a real life bridge that crosses a state highway across a small stream. It consists of two simply supported precast, pre-stressed concrete I-shape, multiple girder spans. In addition to the two end abutments, the bridge is supported by an interior substructure support (bent) consisting of three equally spaced, vertical cast-in-place, round concrete piling (called drilled shafts) topped with a horizontal cast-in-place cross-member called a bent cap.

The end abutment supports are of design similar to the interior support, including bent caps, only the vertical cast-in-place piling are not visible due to the presence of earth slopes at the abutments which are further paved with cast-in-place concrete slab slope protection.

The ends of each of the longitudinal superstructure girders rest on rubber-like, elastomeric pads (called bearing pads) that in-turn, rest on the abutment and interior support bent caps. These elastomeric pads through stretching or otherwise deforming, enable the spans to

elongate with warmer weather, then contract during cooler weather, without structural damage to the bridge or pads themselves.

The roadway deck of the bridge consists of a lower portion of flat, pre-cast, pre-stressed concrete panels, with the upper portion of the deck being cast-in-place dense concrete. The lower portion panels of the deck also served as stay-in-place forms for the deck system during construction. The bridge railing along either side of the roadway is of cast-in-place concrete construction that has been engineered to retain most impacting errant passenger vehicles within the roadway, with minimum injury to vehicle occupants, and minimum damage to the vehicle and the bridge itself.

Transverse, expansion joints, are provided at both extreme ends of the bridge roadway to accommodate the natural expansion of the bridge during warmer periods of the year. These joints have further been provided with seal elements to avoid drainage from the roadway flowing down through the joint openings. This drainage could eventually prove harmful to other structural elements underneath the deck.

The bridge approaches consist of cast-in-place approach roadway slabs to enable smoother entrance onto the bridge, as well as smoother exits away from the bridge. Approach rail has been provided along either edge of the approach roadway, which has been connected structurally with the bridge rail ends to enable any impacting errant vehicle to slide along the combined connected together railing and slow velocity. The extreme ends of the approach railing away from the bridge proper are protected with impact attenuation devices to minimize the crash effect to any impacting errant vehicles. ⚙️

-Ralph Banks, P.E., adjunct instructor for bridge maintenance, TEEX

## Bridge Inspection Components

The Federal Highway Administration (FHWA) sets the inspection standards for almost 600,000 publicly owned bridges in the United States. The current rule that went into effect in 2005 requires all publicly owned bridges to be inspected on an interval not exceeding 24 months unless other circumstances require a more frequent inspection interval. However, a longer interval can only be adopted if approved in writing by the FHWA.

“Examination of a bridge for maintenance issues should be done so methodically taking the components and elements in some sort of sequence,” said Banks, “with some understanding of how the issue came about and the potential adverse effect should the issue not be addressed or remedied. Computerized video animation with audio, such as Second Life, certainly has the potential as a tool in orienting and training bridge work supervisors in this regard.”

Following are some of the specific elements on which a bridge inspection will focus. The stops and notecard stations placed throughout the TEEEX SL Bridge Maintenance Tour highlight each of these issues.

### 1 SIGNS, MARKERS AND DELINEATION

Are the necessary signs, markers and delineation in place and functional? Is the roadway and its edges clearly visible or marked? Are the bridge and guardrail ends marked and/or crash protected?

### 2 EXCESSIVE VEGETATION

Is there vegetation obscuring approach rail ends, bridge rail ends, signs, markers, or bridge railing?

### 3 APPROACH PROBLEMS

Are the approaches settled or rough? Is the interface between the approach and bridge deck roadway rough or otherwise deteriorated? Is there a need for a relief joint between the bridge approach and the abutting roadway pavement, or if there is such a relief joint already in place, is it clogged with debris or otherwise dysfunctional? Is drainage being carried away from the approach roadway without causing erosion or other problems to the approach or abutment? Are drainage appurtenances functioning properly?

### 4 DEBRIS ON DECK

Are there accumulations of debris (such as soil, crushed stone, trash, cover stone, etc.) on the bridge roadway? If so, could measures be taken to avoid or minimize such accumulations?

### 5 DECK EXPANSION JOINTS

Are the bridge deck expansion joints and/or approach relief joints clogged with debris or otherwise dysfunctional? Is there vegetation growing in the expansion joints—a condition indicating the joints are clogged with debris?

### 6 EXPANSION JOINT SEAL

If the bridge deck expansion joints are intended to be waterproof, is the sealant or seal element undamaged and functional?

Are there accumulations of debris atop the sealant/seal element that could eventually cause sealant/seal element damage?

### 7 DECK DRAINAGE

Are the deck drainage elements unclogged and otherwise operational? Is there vegetation growing in the drainage elements—a condition indicating partial or complete clogging of the element?

### 8 BEARINGS

Are the bearing assemblies of the abutments and interior supports free of debris accumulation? If the assemblies are of steel, are they corroded causing dysfunction? If the assemblies are of elastomeric have they remained in the proper position?

### 9 CHANNEL DEBRIS

Is the channel free of accumulations of debris (drift, trash, etc.) lodged against the substructure? Is this accumulation likely causing push and drag loading on the supports during subsequent rises of stream flow? Is the accumulation causing channel blockage and/or diversion of stream flow to where erosion and scour is occurring elsewhere along the length of the bridge?

### 10 CHANNEL SCOURING

Has scouring occurred within or next to the channel causing damage to the structure or abutment slope protection? If so, what can be done to stop or slow down this scouring?

### 11 ABUTMENTS

Is drainage being carried away from the abutments without causing erosion or other damage?

### 12 ABUTMENT SLOPE PROTECTION

Is the abutment slope protection undamaged and functional? Does additional slope protection need to be added? ⚙️



**These elastomeric pads, through stretching or otherwise deforming, enable the spans to elongate with warmer weather, then contract during cooler weather, without structural damage to the bridge or pads themselves.**

# FLSmidth's Virtual Cement Plant



**F**LSmidth, a Denmark-based leading global supplier of cement production technology with facilities in 40 countries, has added one more plant to their list. Their new cement plant, built in the 3-D virtual world of Second Life (SL), may not actually manufacture cement, but it is an accurate representation of the cement-making process. And it can be visited by anyone in SL at anytime just by teleporting over to the FLSmidth Cement sim.

The idea of building an SL-version of the FLSmidth cement plant was initiated by marketing director Anders Godiksen. He secured the services of Flemming Congrejo—owner of Intoint, a Danish IT company—to develop the company's island. "The company's SL build has several goals: gaining experience in the new, virtual 3-D worlds, informing on FLSmidth, and maybe most important—using it as an HR tool—for recruiting," said Congrejo.

Over the last year, several real life companies have focused on using SL as a tool in finding qualified employees. FLSmidth has recognized this opportunity. "They believe that many of the first-runners in Second Life could also be interested in working as engineers at FLSmidth," said Congrejo.

Those looking for jobs can visit the FLSmidth's office on their island and view job boards that automatically update with current job information from the company's Web portal. "FLSmidth also participated in a Danish SL job fair in February of this year and in October last year," said Congrejo.

Some examples of current job opportunities at FLSmidth plants all over the world include sales manager, quality assurance coordinator, reproduction technician, project manager, project engineer, application engineer, and development engineer.

The timeline for setting up the island began with the planning stage in May 2007. Intoint began the actual build in June, and by mid-August, the island was open for visitors. The main focus on the island is the 3-D representation of a cement plant. Upon arriving on the sim, a visitor is greeted with a welcome message and an opportunity to take a tour of the plant through the use of a teleport board. Just by clicking on the board, an avatar is teleported to one of the four main areas of the cement-making process.

### THE FLSMIDTH TOUR

The first stop on the tour is the ATOX raw mill—a specially designed mill for grinding and drying limestone and clay, the two primary, raw materials that make up cement. Hot air supplied by large tubes at the bottom of the mill is used to move fine material into a cyclone where it is then pumped into storage. The remaining raw mix moves onto the next step in the process—the ILC preheater.

The ILC preheater tower, consisting of a series of cyclones, uses the heat from the kiln to preheat the raw materials. From here, raw material is sent to the kiln, the third stop on the tour. The rotary cement kiln is the world's largest moving manufacturing machine and the central machine used in the process of manufacturing cement. Raw material moves through the kiln and is heated to temperatures of 1400–1450° C. This process results in creating a material known as clinker. Clinker drops from the kiln into the cooler—the last stop on the tour.

In the cooler, air is used to cool the clinker. The cooled material is then taken to a grinder where it is ground into a fine material and mixed with gypsum. The gypsum helps to retard the setting time of the cement. After this point, the cement clinker has to be ground into cement, and the production cycle is complete. The

cement can now be packaged and stored in silos or shipped in bags or as bulk cement.

Several other features on the island are located near the cement plant including a reproduction of a job site with an excavator and job trailers. Visitors can also pick up a free FLSmidth t-shirt and hard hat in this area and speak with a FLSmidth representative who is usually present to answer any questions about the island.

### RELATED ATTRACTIONS

FLSmidth also chose to use the island to promote the company's sponsorship of the DTU (Technical University of Denmark) Ecocar. The DTU Ecocar, fueled by a highly modified combustion engine, was developed by a team of students from the department of mechanical engineering at DTU. Each year, the DTU Roadrunners—students taking the Ecocar course—work to further develop the car's design along with other energy-efficient vehicles and propulsion systems. Visitors to FLSmidth's island can take a test drive of the Ecocar on a track that circumvents the island.

**“They believe that many of the first-runners in Second Life could also be interested in working as engineers at FLSmidth.”**

**Flemming Congrejo**

Finally, visitors can travel up the elevator, located near the welcome area, to the FLSmidth office to view the job advertisements and videos that highlight FLSmidth's products and worldwide operation. One video shows the construction of a plant from equipment delivery to completion in the span of a few minutes. Another portrays the history of the company through a series of photos taken from 1882 to 2007. The third video, also the longest of the three presentations, is offered in Danish and English languages and gives a comprehensive inside view of the manufacturing process from the quarry operations to the bagging of the final product. ⚙️

## FLSmidth—A Global Company

FLSmidth was originally founded as the Technical Bureau by Frederik Læssøe Smidth in 1882 in Copenhagen. Soon after opening for business, Smidth took on partners Alexander Foss and Poul Larsen and the name was changed to FLSmidth & Co. By 1887, the firm had their first major cement machinery contract signed, and the three engineers began work on a cement plant for Limhamn Cementbolag in Sweden. Over the years, the company branched out to other countries and grew to employ about 7,000 people worldwide.

Today, FLSmidth is the world's leading supplier of cement with facilities located all over the world. The several groups that make up the complete structure of FLSmidth focus on cement production, mineral processing, and complete technology solutions and

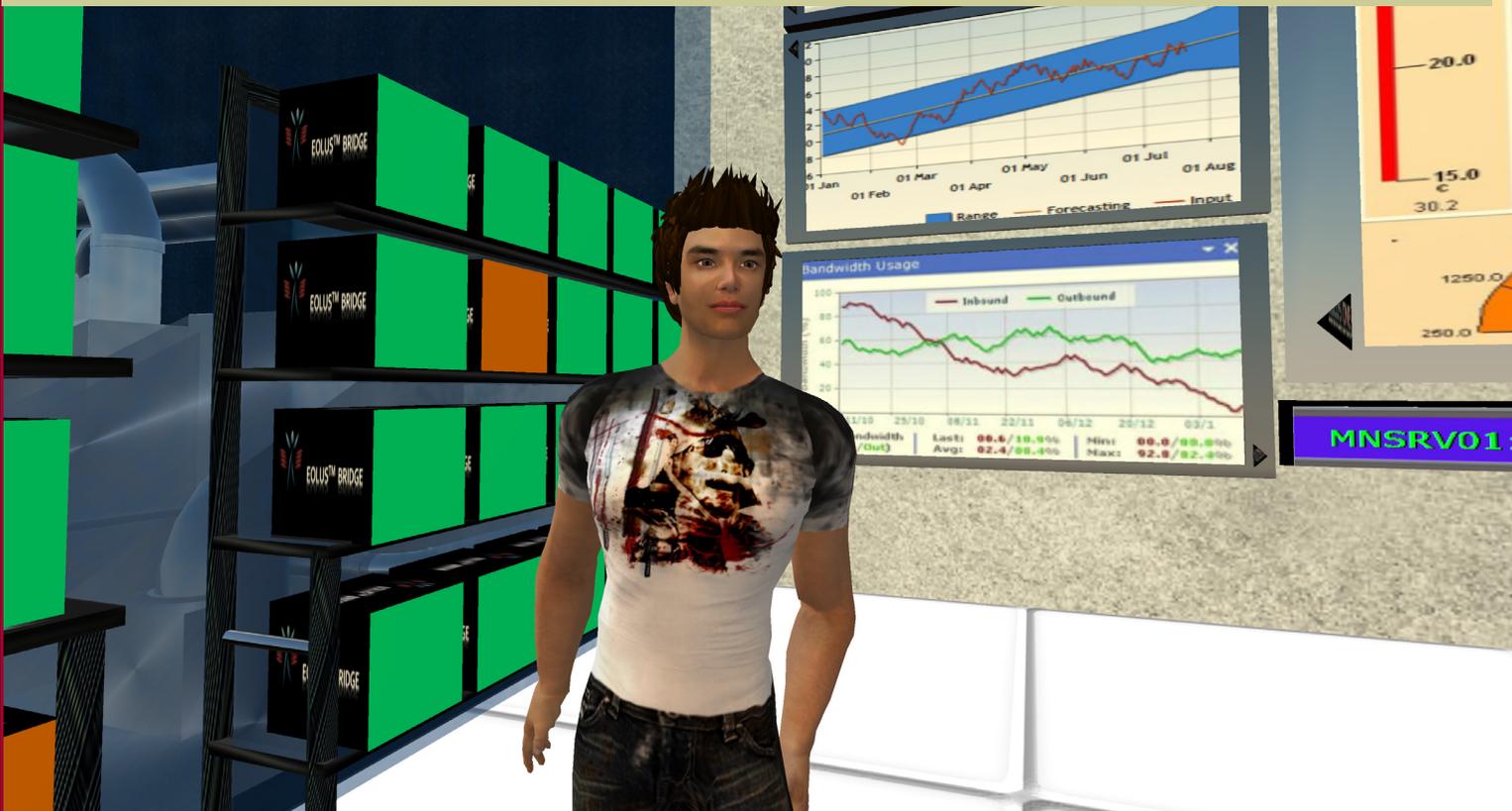
support services for other facilities within the cement and mineral industry.

Following are a few facts about FLSmidth:

- Since 1898, FLSmidth has built approximately 2,000 cement kilns in North America, Central America, South America, Europe, Russia, the Middle East, Africa, Asia, India, and Australia.
- FLSmidth's market share in 2006 was 29% of the global market for new cement kiln capacity (exclusive of China).
- In the provision of equipment for full-scale, up-to-date cement plants, the only segment in which FLSmidth is not involved is the blasting and quarrying of raw materials. ⚙️

—Source: FLSmidth's Web site at <http://www.flsmidth.com>

# Monitoring Real Life



Last year, Implenla, Switzerland’s largest construction and building services provider, conceived and developed the virtual worlds communication interface (VWCI)—a tool for monitoring the most common building automation systems. And in July 2007, the company opened Eolus One, an island in Second Life (SL) to serve as a showcase of this technology. Oliver Goh (Eolus McMillan in SL), business development executive with Implenla, was responsible for creating the company’s vision of integrating real world building systems and the interface of virtual worlds. Goh, represented by his avatar, oversees the island’s operations in SL.

For many years, Supervisory Control and Data Acquisition (SCADA) systems have been used for collecting and displaying this same type of information on a panel or a computer screen in a 2-D format where an operator can not only monitor information, but can also make changes to the system from the control panel. VWCI takes this one step further by allowing the operator access to the operation from anywhere there is a computer connection to the data and immerses the operator in a 3-D representation of that data. SL demonstrates the benefits of a VWCI for monitoring the operation of a facility because the technology allows for building data collected in an electronic form to be displayed in a user-friendly interface.

Depending on the needs of a facility and its operation team, this 3-D interface could be represented as a 3-D control panel similar to

that found in a facility or as an even more immersive representation allowing the operator to virtually walk through the building, actually seeing the data represented in some form. For example, a pump may be shown as green or red depending if it is running or off. Or perhaps a virtual on/off panel could be shown that responds to the conditions of the real life on/off panel. VWCI allows this 3-D panel to be used for either monitoring only or for the actual operation of equipment with the operator actually turning equipment on or off by clicking the virtual switch.

Normally, set points on a tank level are set through a SCADA system by changing a number or moving a slider in the computer program. In the VWCI, the operator could walk up to a virtual tank, move a virtual set point along the side of the tank, and then watch as the virtual water rises or falls. This virtual manipulation of equipment can create a safer working environment for the monitoring and operation of a hazardous system—one in which the operator would never enter the actual facility while a process was running.

A demonstration of the VWCI is set up beneath the main building on Eolus One as a 3-D monitoring system displaying information from the HVAC system of actual buildings in Switzerland and Germany. Numbers floating above cubes allow the visitor to see real temperatures inside those buildings.

Implenla currently has 12 pilot sites using this technology in several areas of the world. Because the company’s clients span all

**The VWCI interface, shown on this poster, links 3-D representations of objects to real life components. Operators can then manipulate or monitor those components through the use of virtual world software like Second Life or Opensim.**

markets from residential to commercial, these installations can be found in private homes, retail stores, and other commercial sites. In the United States, the system has been implemented in places such as Palo Alto, Calif., and Seattle. Because each facility generates different types of data depending on its operation, Goh said the implementation cost of a VWCI will “depend on the size of the building, the number of data points, and a number of factors like interfaces used—usually starting somewhere around \$5,000 USD and upwards.”

For some facilities like water and wastewater plants that already measure and collect operational data in an electronic format, the cost to include a VWCI would not be unreasonable. “The data could be sent in 0-10v, pt100, 4-20mA depending on the installation,” said Goh. “Usually we take the equipment that is installed, and we are able to overwrite the controls and change settings. We support the most common protocols available in the building automation scene: Modbus, LON, CAN, KNX, and Profibus.”

Because of security, Goh said, “There is no way we can have the production environment in SL. You could really do some damage if you have unauthorized access.” Therefore implementation of a VWCI would be done over an intranet or private grid. The Opensim project

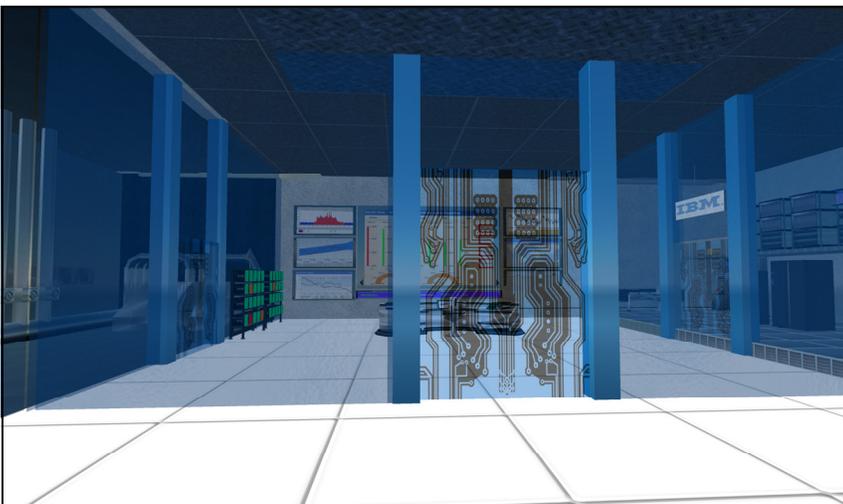


has allowed for further development of this approach. Using Opensim technology, a 3-D interface can be set up on a company’s intranet so that proper security measures can be implemented and access limited to only those individuals who have clearance.

Someday a fire department may have a VWCI set up with a 3-D representation of either all buildings in a city or only specific buildings. When conditions within a building created an emergency situation, such as a fire, the department would be alarmed through the VWCI. This could be implemented “using the advantages of 3-D platforms like rez-on-demand so unless there is an issue with a building, its 3-D representation remains in its box. When the problem arises, the virtual building unfolds and teleports us to the problem area,” said Goh. The department could then prepare to address the situation by accessing information like drawings and images stored within that building’s 3-D component.

With the increasing popularity of building information management (BIM) models and emergency response programs, VWCI offers a user-friendly option for successfully implementing these new technologies and systems throughout the industry. ⚙️

**This virtual operations center lies beneath the building on the Eolus One sim. Inside the center are panels and objects that are monitoring real world systems. For example, hover text over boxes displays the real time temperatures of a group of buildings in Switzerland and Germany.**



## Tools from the Grid

The merging of Web applications with online networks and 3-D virtual worlds has evolved into what many refer to as the metaverse. This term, taken from Neal Stephenson's novel, *Snow Crash*, describes the emerging digital community or world in which people learn, work, play, shop, and interact. A place where people often visit using a digital representation of themselves called an avatar.

Some have been following the development of the metaverse for years. But for others, its emergence has come as a complete surprise. For those new to the digital world, venturing into its realm can be a daunting enterprise. In an effort to help our readers navigate through the metaverse and focus on the areas that are more science-related, the Grid Works will occasionally include reviews or articles about useful places and tools. And because the metaverse does not only encompass virtual worlds, some of these reviews will include other areas such as blogs, wikis, and social networks.

The two reviews in this issue include one article profiling a site offering files that can be incorporated into plans by engineers and architects. Engineers have shared information for years in an effort to standardize specifications and plan and construction details. These sites take this sharing one step further by allowing anyone to upload files they have created, particularly those that are used by 3-D applications, and give or sell them to others. As they say, "why re-invent the wheel?" Some of these sites are hosted by individuals while others, like the one profiled, are set up specifically to create a space where many can share their creations. Users of virtual worlds like Second Life may also find resources on these sites that can be used in -world. However, users need to always check the terms of use and permissions that determine how the files can be used. Some files can only be downloaded for personal use while others allow people to use the files in commercial products or creations.

The other article in this section highlights how the use of wikis can provide a sense of community while creating a space for collecting and sharing of information. Anyone or any group can set up a wiki today, offering the opportunity to create a collective consciousness on a particular topic. One that can then be accessed by anyone looking for information related to that topic. A wiki can hold the collective knowledge for a particular subject, profession, company, or agency. Because of this, wikis may someday be the answer to preventing the loss of knowledge by those retiring or leaving a particular job or position. ⚙️

# MANHOLE SIZING KIT

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From offering digital content to hosting a storefront in which artists can promote and sell their work, TurboSquid, at [www.TurboSquid.com](http://www.TurboSquid.com), provides a useful site where artists and developers can acquire and sell digital material. Founded in April 2000 as a vehicle through which content creators could post and sell their products, today, TurboSquid has over 1.2 million registered users that regularly visit to acquire quality products from over 195,000 files.

Matt Wisdom, chief executive officer of TurboSquid, said, "Our site offers easy collaboration tools to allow 3-D artists to get their work out. People were surprised in the year 2000 with the concept of allowing others to put things up for sale on the Web. But we wanted to try and take this gigantic group of artists and help them get into creating content to reach consumers. Our registered members come from a lot of different industries such as those working with computer games, virtual worlds, news agencies, defense contractors, film, television, architecture, organizations."

The 3-D section of TurboSquid offers a selection of over 195,000 files in several categories such as animals, characters, aircraft, architecture, and many others at prices ranging from free to \$1,500 or more. Files are provided in several formats such as DXF, 3DS, OBJ, and others used by Maya and Lightwave software. Product specifications are given for each set including the media type, date published, geometry, number of polygons, vertices and an indication if textures or materials are used, or if the content is jointed or animated.



**This pizza image, a sample of the types of textures offered for free at Turbo Squid, looks good enough to eat.**

TurboSquid also offers Tentacles—a free plug-in that integrates TurboSquid's online collection with 3-D applications such as 3ds Max, Maya, XSI, or Cinema4D. Although available as a stand-alone, the plug-in version allows users to drag items from the TurboSquid library directly into their own applications. Tentacles also allows users to set up collaborate workspaces to share and communicate with others. "Teams using this product are made up of people from around the world," said Wisdom. "By using the collaborative workspaces, these companies are able to gain access to the best talent available. Sometimes people have not even spoken by voice to the people they work with."

The site also offers many other plug-ins for professional 3-D applications with enhancements that include explosions and other special effects, texture mapping, character animation, rendering and painting, and conversion of files to mobile and gaming content.

The average user of Second Life (SL) may find the texture section of TurboSquid's site particularly useful. Although textures and texture packs can range from a cost of \$1 to \$798, a large number of textures are offered for free. An advanced search is available to allow users to target files based on type, cost, author, keywords, category, date published, and rating. Because all of the files are provided royalty-free unless designated otherwise by the author, anyone can download and use the files in their 3-D creations.

So if a furniture creator in SL wanted to use a fabric texture on furniture that they make and sell in SL, they could register as a user at the TurboSquid site and gain access to over 2000 fabric textures—75 of which are offered for free.

## WEB SITE REVIEW

In the game tools area of the site, developers can download gmax, a free games customization/modification toolset from Autodesk based on Discreet's 3D Studio Max 3D animation platform. Microsoft, Electronic Arts, and many other developers and publishers of popular games offer gmax-enabled games to allow their game consumers to modify their game experience by uploading their own characters, weapons, and vehicles. TurboSquid also sells Turbo Toyboxes—pre-made gmax sets that include models that can be modified, animated, and exported into a gamer's favorite game title.

Artists have uploaded gmax models for purchase with prices ranging from free to \$250. Free and low-cost models are typically single objects like guns and weapons, while the more expensive sets include characters, vehicles, and models of entire cities.

Artists in SL interested in selling their creations can join TurboSquid, upload their textures, and offer them for free or for sale. "Our high selling items are usually those offered in OBJ or multiple file formats," said Wisdom. "To sell your work, you must sign up with a user name, password, and e-mail. Then you can publish immediately." TurboSquid hosts the products, markets them, processes credit card transactions, and pays the artist royalties. The artist pays no fees for this service—TurboSquid is paid by splitting the sale revenue with the artist 50/50.

TurboSquid requires artists to fill out the paperwork for tax collection purposes, but Wisdom said that any artist can sign up and start selling without initially filling out anything. This allows someone to test the site to see if they believe there is value in selling through TurboSquid prior to sending in any personal information. Each artist has an account into which money from sales is deposited. TurboSquid is also currently working to allow an artist to use the credit in his balance to make purchases from other artists.

In addition to offering a storefront for the sale of digital content, TurboSquid has set up a forum where users can share advice, news, and job openings, information about related software, methods, and other topics related to digital content. Through the forum, aspiring artists can access advice and talent from TurboSquid's online artist community.

When an easy method of importing 3-D models directly into SL is finally developed, TurboSquid will likely play a significant part in offering 3-D content for this purpose. Until that time, users in SL can visit the TurboSquid Web site to acquire 2-D textures, and artists in SL can find another place to sell their digital creations to an even wider customer base. ⚙️

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## CONFINED SPACE ENTRY MOBILE TRAINING UNIT

The Texas Engineering Extension Service, a leader in hands-on safety training, now delivers confined space entry training to any location, using a unique, self-contained mobile training unit. Simulated hazards, including smoke, darkness, flashing lights and loud sounds, add to the realism of the training environment. Employees will learn first-hand how to perform confined space entry safely under a variety of scenarios, while complying with OSHA and other safety standards.

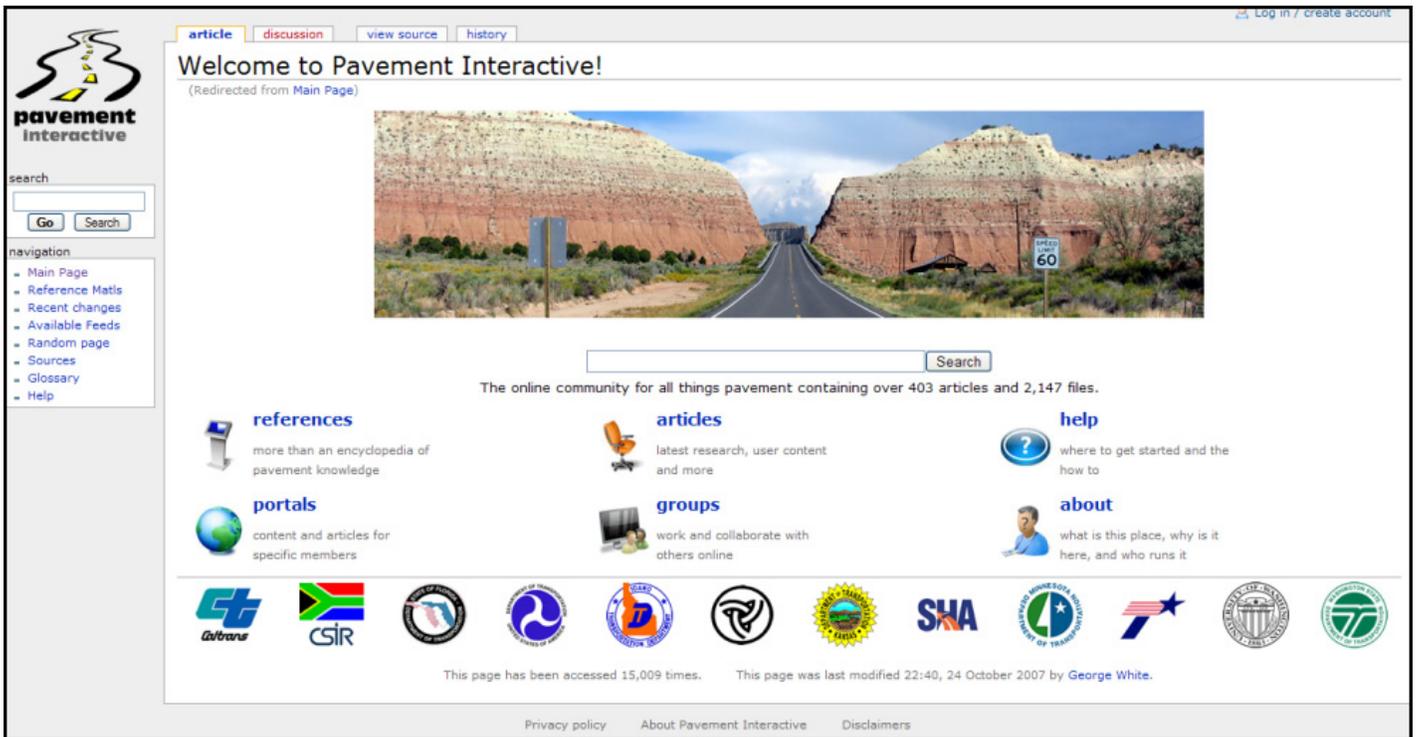


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Pavement Interactive is a new wiki-based Web site for all things pavement from materials to design to construction and maintenance. The site was developed by a pavement consortium consisting of DOT agencies and the University of Washington in an effort to utilize Web-based tools as resources for pavement training.

During a recent Webinar introduction, George White from the University of Washington explained that the Web site was the outcome of a "five year study aimed at helping incorporate technology in the pavement business for the benefit of education and management of data and information." The study's intention was to produce an Internet-based, multi-media document. After reviewing several methods, members decided the wiki layout was the best suited format to accomplish both the short- and long-term goals of the partnership. Although only one and a half years are remaining in the study, the foundation laid out by the wiki creators should continue to provide valuable tools to users for many years to come.

The 12 member organizations supporting the development of the wiki are primarily composed of state departments of transportation but also include agencies such as the Federal Highway Administration, the University of Washington, and The Council for Scientific and Industrial Research (CSIR) in South Africa. As expected in a wiki environment, hot links are provided to all of the member organizations.

The quickest way to locate information is through the standard search function provided on all of the pages. If the user prefers to follow a more traditional path using the pavement guide, there is a reference link that provides access to more than 3.5 gigabytes of information in over 5,700 media files.

During the Webinar, the creators emphasized the importance of the development of a guide for pavements. With over 300,000 people directly and an additional 600,000 people indirectly involved in roadways, the advantages of providing a "collaborative Web site" are easy to realize. Couple the economic impact of the industry with the fact that 50% of construction workers will be eligible for retirement by 2012, and the vital role this database of information provides becomes apparent.

The analogy presented during the 45-minute presentation correctly compared the wiki to a function similar to that of a library. In addition to the mass storage of reference materials, the structure of the site encourages groups to develop and then work and collaborate online using the wiki in a manner similar to that of a meeting room. The site also allows for portals to target specific users in a method similar to that of arranging books by author or subject and for articles to be written expanding the content much like new arrivals on the library shelf. Add all these features together with the ability to receive news feeds, updates, articles, and discussions in real time, and all this results in a highly effective use of some of the best technologies available today. ⚙️

[www.thegridworks.info](http://www.thegridworks.info)

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