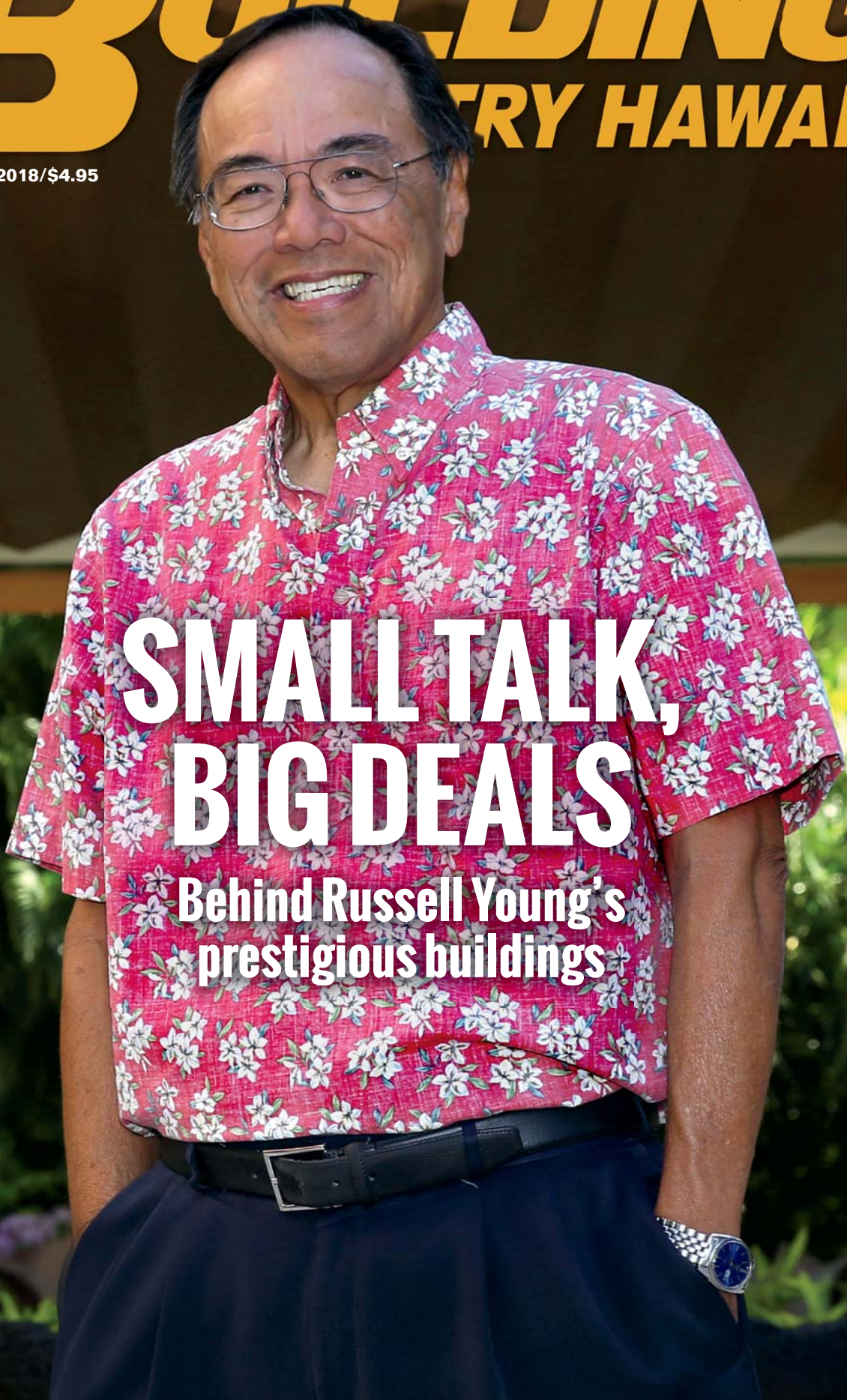


**INSIDE: COMPLETE PACIFIC BUILDING TRADE EXPO GUIDE**

# **BUILDING** **INDUSTRY HAWAII**

**NOVEMBER 2018/\$4.95**



## **SMALL TALK, BIG DEALS**

**Behind Russell Young's  
prestigious buildings**



# High-Tech Tools

The VDC program Revit, lauded at Keahou Place, also supports Hensel Phelps' airport project

BY BRETT ALEXANDER-ESTES

**R**ough-and-tumble jobsite pros, looking to save time and money, are getting to know pointy-head Virtual Design Construction programs inside and out.

Hawaiian Dredging Construction Co. Inc., one of the Islands' largest contractors, recently utilized Revit, a typical VDC program, to transfer a working model to the build-out of Keahou Place. James Abeshima, Hawaiian Dredging's senior project manager on the Kakaako job, says the model helped coordinate field staff and subcontractors and performed clash detection.

Revit can also aid in tasks ranging from site usage to concrete formwork operations, says Chris Baze, Building Information Modeling (BIM) manager at Hawaiian Dredging. And since Revit allows simultaneous response by all team members, it often improves productivity and profit margins.

At the Daniel K. Inouye International Airport Mauka Concourse Expansion, Hensel Phelps is also using VDC to aid in construction.

"VDC was implemented at the start of the project, and will be used all the way until construction is complete," says Angelo Lago, VDC manager at Hensel Phelps. "We make sure that our models stay up-to-date while construction progresses."

Still, many GCs are reluctant to tackle VDC and related design technologies. According to an analysis by *Construction Dive* of the yet-to-be released *JBKnowledge 2018 ConTech Report*, while GCs like drones, smartphones and tablets, they see design technology as a mixed bag offering few practical benefits.

## Thank the Architects

Tight jobsite teamwork is spurred by the rapid evolution of design tools. "Technology is developing faster than

it ever has in the past, and that is particularly true in the profession of architecture," says Ma Ry Kim, architect and principal at Hawaii design firm G70 and executive managing partner of design and development for Thoroughbred Hawaii.



Ma Ry Kim

Over the last two decades, Kim says, Hawaii architects moved from computer-assisted design, a 2D drafting program, to Revit. Revit "allows the user to design a building (and) its components in 3D, keynote the model with 2D drawing elements, and use a database that has collected and organized information from the base model itself."

## Structural Strength

Frank Humay, vice president at Baldrige & Associates Structural Engineering Inc., a Hawaii structural engineering firm, says "analytics"—that is, hand calculations combined with "3D finite element analysis programs"—were



Frank Humay

critical in determining the load path on Hensel Phelps' \$75 million Schofield Behavioral Health/Dental Clinic project.

"As part of the DOD antiterrorism requirements, the Schofield project must be designed to avoid progressive collapse," Humay says. "This includes ensuring that the building remains standing in the event that an exterior load-bearing member is removed."

Humay says the building exterior consists of load-bearing precast concrete walls approximately 30 feet long







Hawaiian Dredging recently used Revit to transfer a working model to the build-out of Keauhou Place  
PHOTO COURTESY HAWAIIAN DREDGING CONSTRUCTION CO. INC.



and one story tall.

“For the progressive collapse avoidance analysis, an entire wall panel is analytically removed from the building,” Humay says. “The remaining structure must remain stable by developing an alternate path for the supported floors above. The innovative approach for our project is to hang the floors below from a precast concrete parapet beam that then transfers the load to the adjacent intact precast wall panels.”

Hand calculations were first used to develop this approach, Humay says, and “once we understood how the structure was supposed to behave, we used a number of different 3D finite element analysis programs to verify our rough hand calculations and generate the final detailed design.”

Emphasizing that engineers must also “verify the reasonableness of any computer-generated output through basic statics (hand calculations),” Humay notes that a “Revit model was used extensively to coordinate the composition of the precast panels with the architect, contractor and precast manufacturer. Through the use of 3D finite element analysis software, we determine the required concrete wall thicknesses, strengths and reinforcement requirements.”

## Models in the Boardroom

Developers, who also need to know every square inch of their projects, often review new ventures with 3D printed models.

“Complex and intricate model-making components, such as a façade with multiple curvatures, folds and perforations, or a structure with twisted and weaving elements, can now be produced easily and efficiently

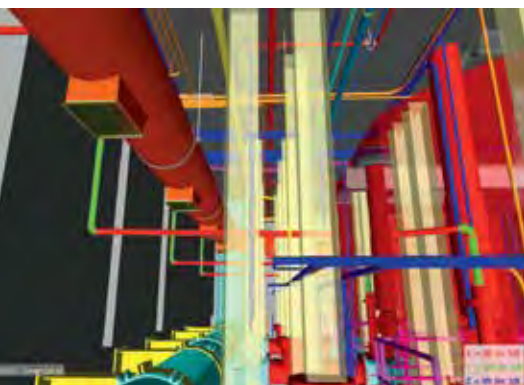


Image shows the result of effective coordination. Hensel Phelps established clearance zones (shown in yellow and red) for a plant's lifting eyes and swing crane.

IMAGE COURTESY KRWWTP/HENSEL PHELPS



RJ Models' 3D printed model of Tokyo's new National Stadium designed for the 2020 Summer Olympics  
COURTESY RJ MODELS



RJ Models installs a Kaohsiung Port Terminal 3D printed model, scaled 1-150.  
COURTESY RJ MODELS

with 3D printing,” says Ray Cheung, founder and director of RJ Models, a Hong Kong-based 3D model manufacturer. “This allows geometries created by designers ... to be presented to their client.”

The firm's models are printed from files created in BIM, SketchUp, Rhino, 3D Max, 3D AutoCAD, Proe, Solidworks, Ug, Magics and other programs. Cheung says the 23-year-old company has produced models for “world-renowned architects such as Foster + Partners, Zaha Hadid Architect, KPF, SOM and OMA.”

Contractors frequently use 3D printed models as well. “3D printed models ... can discover the potential of certain issues that may occur in the project well in advance,” Cheung says. “This ... offers very good value for the money.”



Ray Cheung

## Changing at Warp Speed

“Parametrics, or generative design, a completely new way to design a 3D shape,” is increasingly replacing Revit in Hawaii's university design studios, says Kim. Rather than first visualize a shape and then calculate its measurements, she says, a designer “sets the ‘parameters’ of a shape and uses algorithms to define its final outcome.”

But there's even more change afoot. “Today, we see an explosion of 4D technology, which takes 3D digital programs into the dimension of real time,” Kim says. “Lumion and Enscape, visualization programs used by several firms and universities in Hawaii, provide powerful ways to ‘walk through’ a 3D model. Like an optimized video game, the program allows the user to add moving people, landscape, entourage, lighting, water, materials and more to models created in compatible 3D programs such as Revit, SketchUp, and Rhino”—with live-time added as a bonus.



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## The LAANC & VDC

VDC is often paired with UAS (drones), which now can receive near real-time airspace authorizations via the Federal Aviation Administration's recent Low Altitude Authorization and Notification Capability ruling.

The LAANC "alleviates the burden of asking the FAA for drone airspace authorization, and speeds up other aspects of the authorization process," says Michael Elliott, owner and general manager of Drone Services Hawaii. "Previous to the ruling, it has taken nine months to a year on average to receive FAA drone airspace authorization."

Hensel Phelps is using a UAS on the DKI International Airport Mauka Concourse project, but hasn't yet incorporated the LAANC into its construction schedule.

"Due to the fact that the Mauka Extension project requires specialized considerations for flying our UAS on an operating Class B airport, to date we have not utilized LAANC at that location, though we intend to in the very near future," says Mark Blacklin, lead VDC engineer at Hensel Phelps. "We are hopeful that as the LAANC system grows and improves, it becomes more and more effective, thus enabling the continued safe operation of UAS in the national air space."



Michael Elliott



Mark Blacklin



Hensel Phelps sUAS team receives flight clearance from DKI International Airport's tower for HP's Mauka Concourse project.

PHOTO COURTESY HENSEL PHELPS

"It has completely changed the way that design is processed and presented," Kim says. "4D programs allow the designer to explore every corner of the building or space as if it is a tangible object, observing the relationship of the built space to the movement of the sun."

### Tomorrow's Projects

Island contractor organizations like the Building Industry Association of Hawaii and the General Contractors Association of Hawaii often provide training in design technology. In August, for example, GCA offered two BIM seminars tailored for contractors.

Hawaii builders need to stay on top of new tech, but they do have

time to catch their breath. "In Hawaii, parametric design is currently more prevalent in the university design studio than it is in practice," says Kim, noting that the "limitation of construction methods and materials ... is creating a gap between what is produced in schools and what can be built in the real environment."

Elsewhere, however, it's a different story. The *JBKnowledge 2018 ConTech Report*, according to the analysis by *Construction Dive*, claims that 32 percent of its national building industry respondents say they believe augmented, virtual and mixed reality technologies will provide their firms with a strategic advantage. 🏠