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The Latest

In our last newsletter, I mentioned we were going to Cleveland to visit [Guardian Structural Technologies](#). They manufacture insulated panels, which we will talk about in this newsletter. We are engaging with them about performing engineering for their shop drawings and are excited about continuing to work with them in 2024.

In other work, we continue to work with several different architecture firms on container homes and we've got some other projects with Guardian's product that we're starting on. We also continue to do the [ACM panel work](#). We have added another employee, and we're rather cramped in our office right now - I don't see that situation changing in the foreseeable future.



We brought all of Runkle Consulting's regular employees up to Cleveland to meet the GST team and work together in-person on a variety of projects.

Our Visit With Guardian Structural Technologies



So, let's talk about Guardian Structural Technologies product - Shield Panels. The system is somewhat like your standard structural insulated panels (SIPS), except for **their strength is from cold formed steel that is embedded in the panels**. Like the SIPS, they provide extreme insulation values, and can be erected quickly. The panels act as the siding and the exterior structure of the building.



SIPS panels work a bit different from the Guardian product. A SIPS panel is typically Extruded Polystyrene (EPS) panels with wood sheathing on both sides of the panel to provide the strength. That makes the SIPS panels pretty heavy, and for the larger panels you need crane to put them in place. The Guardian panels use light gauge steel inside the panels to provide the strength, and you don't have the heavy sheathing on the outside faces. That makes the panels extremely light, and in most cases they can be put in place by hand. They are also very easy to cut to shape and put into place.

Structurally, the panels handle most of the loads with the cold formed steel inside the panels, which from our standpoint makes our analysis pretty straightforward. It's standard calculations for the strength using methodology from the American Iron and Steel Institute (AISI) specifications. Because of the thickness of the insulation, you get some extremely high R values and no thermal bridging. Since the material is so light there is less weight on the foundations. This also gives a benefit to earthquake loads,

since the structure is lighter.

Looking at the product as a former facility engineer with the military, a few things struck me as an advantage for a building owner. The big one is we don't have issues with leakage, condensation, and rot. Conventional construction if it is not done right can lead to serious water infiltration issues, which we don't have so much here. Since the panels are inorganic, unlike SIPS that have wood sheathing on both faces, the panels aren't so vulnerable to water damage, and they won't rot. The insulation is closed cell EPS, so you aren't going to get condensation inside the walls, which you can get with standard construction if the insulation and vapor barriers aren't done right.

Also drawing on my experience as a military engineer, the product is easy enough to work with that we could have built with it using troop labor. The issue we had in deployed situations where I've been in the Middle East, Central Asia, and Central America is that the skill level of the personnel under me was variable, so conventional construction often resulted in results of substandard quality. This product is easy to work with, and from what I see you can use a semi-skilled work force with a couple of people that are highly skilled doing the supervision. Normal hand tools can be used for cutting it, and no special skills are needed for its assembly.

So, I was pretty well sold on the product. As I said in the introduction, we're looking to be working with Guardian in providing them engineering for preparing their shop drawings, so I hope others will be sold on the product too.

The Diner... America's First Modular Building

At Runkle Consulting, we do a lot of work with custom-built structures that are transported to the desired address and placed on a concrete foundation. But it may surprise our readers to learn that this method of construction began 100 years ago... with *Diners*. Shipping containers are, in fact, just the latest source of material in almost a century of modular construction.

Have you ever noticed that all diners look alike? While today it may be a conscious decision to inspire nostalgia, in the 1920s and 1930s, it was a matter of economics. Many diners were manufactured by a single corporation in Massachusetts or one of its dozen or so competitors in New Jersey! After being purchased, these diners were shipped via rail to a customer in whatever city they planned to open the diner.

How did this happen? The impact of electricity on the market economy. According to the podcast "Stuff You Should Know", most restaurants before World War I closed by 8pm, which was a problem for workers as the industrial revolution and electricity brought 24-hour factories into existence. In Providence, Rhode Island, a man named Walter Scott pioneered the selling of food from mobile establishments on horse-drawn wagons and the idea spread across New England. They became so popular that local communities established ordinances to keep these "night owls" off the road at certain hours due to sheer volume of them – similar to the zoning restrictions of today.

However, some of the more ingenious operators identified a loophole in the law. Since many communities were replacing horse-drawn streetcar with electric-powered street cars, there was an abundant supply of cheap, surplus horse-drawn street cars that had no apparent economic value. Entrepreneurs soon realized that the laws designed to restrict "night owls" did not apply to static structures! So as long as the purchaser of a horse-drawn street car didn't attach horses to it and it didn't move the structure from wherever it was initially placed, there were no restrictions on when food could be served. As popularity grew, so too did the number of establishments and the need to be unique in order to attract customers.

About the same time the supply of excess street cars was running out, owners began to realize that investing more money in the structure could increase profits by enticing families to come eat. Customers soon instead turned to the Worcester Lunch Car Company in Worcester, Massachusetts, which was experimenting with the conversion of railroad cars used for dining into a restaurant called a "diner".

During the first half of the 20th Century, the company would produce over 650 custom-built diners that were then shipped on rail cars across the United States. Customers would provide the

company with information about the size of the lot to be occupied, the number of booths desired and how many customers the owner wanted to place at the counter. These lunch cars all featured marble counters and polished wood booths that provided a sense of luxury at an affordable price.

The demand for custom-built diners became so intense that competitors began building modular diners in New Jersey. Unlike the ones built in Massachusetts that had polished woodwork and marble counters, these dining cars were constructed out of stainless steel and significantly cheaper, while looking more modern as America transitioned into the post-World War II jet/space age. Through the mid-20th century, at least a dozen different factories in New Jersey produced these diners and sold them across the nation where they would occupy their place in popular culture. All built from a common blue print, customized, and shipped via rail car to their eventual destination.

That was 100 years ago... what do you think a modular building will look like in 2123?

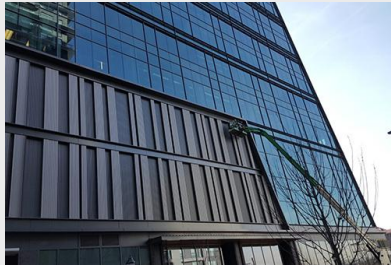


Structural Engineers

Runkle Consulting was founded in 2000 by George W. Runkle III, PE, SE. We provide structural design for structures fabricated from shipping containers, the structural design for building cladding, and forensic engineering services.

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What We Do



Building Cladding

We have 15 years of experience in the structural engineering of exterior building panels, store fronts, and curtain walls for commercial and government buildings.



Shipping Container Buildings

We provide design services for the design of buildings fabricated from repurposed shipping containers. Our services include the complete design package, architectural, structural, and MEP. Depending on the area, we may be able to help you find a fabricator to provide the containers.



Cold Formed Steel Design

We have extensive experience in cold formed steel design. We can provide structural design services and shop drawings for your project.

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