ANTI-SKID SKIMMER TOOLS OF THE TRADE SOLID SHRIMP FARM

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A Shrimp Farm in the Desert

ABOVE ▲ Why do you need 44 ponds in the middle of the Las Vegas desert? To farm shrimp, of course! Restaurants, casinos, and retail markets can now get locally harvested and fresh seafood!

ABOVE ▲ Adrian Zettell of Dragon Spray Systems not only designed the 76,400 square foot (7,098 m²) aquaculture facility, but also coated it with the help of his five-man team.

BY JENNIFER FRAKES

PHOTOS COURTESY OF DRAGON SPRAY SYSTEMS

With the expertise of Adrian Zettell of Dragon Spray Systems and the polyurea technology of Specialty Products Inc. (SPI), a 36,000-square-foot (3,345 m^2) aquaculture facility is thriving in the desert just outside of Las Vegas, Nev. How did something that sounds more than a bit far-fetched become a reality? Read on to find out how this 44-pond shrimp farm came into existence and how the coatings industry made it possible.

WHAT IS A SHRIMP FARM?

Contrary to the image that may come to mind of little shrimp lying in rows in the ground next to this year's vegetable crops, shrimp farming is a sophisticated and complex science. Shrimp farming is a part of the aquaculture industry, or the farming of aquatic organisms, such as fish, shellfish, or plants. It is a growing industry built around the concept of sustainable seafood, which means the food is either fished or farmed in such a way that production can be maintained or increased in the future without harming the ecosystems from which it was acquired. In other words, aquaculture facilities provide a sustainable and environmentally sound alternative to overfishing or using other environmentally destructive fishing methods.

This particular Las Vegas-area aquaculture facility houses 44 ponds built from recycled shipping containers. Shrimp are grown and harvested in the ponds over the course of approximately four months. According to Zettell, the facility has a proprietary, state-of-the-art, bio-filtration system that raises salt-water shrimp in a self-contained, indoor pond system under conditions that are designed for optimum quality and growth, as well as to conserve water. "The ponds are a 100 percent closed loop system, so there is never a need to refill the ponds once they have initially been filled," said Zettell. And because it is an indoor facility, the water lost to evaporation can be captured and reclaimed.

The chosen location of the shrimp farm may surprise many people, but it actually makes perfect sense. The aquaculture facility is just outside one of the most popular tourist destinations in the United States. Restaurants, casinos, and local retail markets now have access to local, fresh, and sustainable shrimp. As stated by Zettell, the shrimp are harvested and delivered in a matter of hours. That's quite the short trip from farm to table!

ALL ABOUT AQUACULTURE

As the idea for the aquaculture facility began to take shape, a Las Vegas-based biotech firm consulted with Zettell, who is no stranger to the aquaculture industry. In fact, in 2001, Zettell designed a small-scale aquaculture facility in his home state of North Dakota. "The environment in a

Each shipping container had to be sprayed inside and out to help create a self-contained system. That meant all steel, marine-grade plywood, foam, and fabric was sprayed.

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ABOVE ▲ The crew applied the polyurea to the interior of the shipping containers at approximately 80 mils (2,032 microns) in a custom blue color to match the shrimp's habitat.

salt-water aquaculture facility is extremely unforgiving. We tried a variety of coating products in the ponds, and everything we tried failed. That's when [Dragon Spray Systems] found SPI. We purchased our machine through SPI and had an on-site training class on the application of polyurea coatings," explained Zettell. "The SPI coatings worked extremely well and are still in service."

In 2009, Zettell embarked on another aquaculture project. This time it was an expansion of a 5,000-square-foot (465 m^2) facility. Zettell once again turned to SPI coatings. He installed SPI's Envelo-Seal 3-lb. (1 kg) spray polyurethane foam for insulation and sprayed SPI polyurea throughout the facility. The successful completion of this job led Zettell to the 36,000-square-foot (3,345 m^2) ground-up shrimp farm outside of Las Vegas, which is a facility he not only designed but also applied the coatings system to with the help of his Dragon Spray Systems crew.

BELOW ▼ Each pond was formed using a recycled shipping container. Because they came from different countries, each container and, therefore, pond had slightly different dimensions.

JOB AT A GLANCE

PROJECT:

Application of polyurea coatings to a newly constructed shrimp farm with 44 ponds located just outside Las Vegas, Nev.

COATINGS CONTRACTOR:

Dragon Spray Systems
Newburg, ND
(701) 272-6282
www.dragonspraysystems.com

SIZE OF CONTRACTOR:

Varies depending on the job

SIZE OF CREW:

Five-man crew consisting of two spray applicators

PRIME CLIENT:

A sustainable aquaculture facility that provides shrimp to local restaurants and retail markets

SUBSTRATE:

Recycled shipping containers tied into new concrete slab, steel, marine-grade plywood, concrete, spray polyurethane foam, and geo-textile fabric

CONDITION OF SUBSTRATE:

Solid with occasional irregularities

SIZE OF JOB:

Approximately 76,400 ft^2 (3,345 m^2)

DURATION:

The facility was built over a six-month period, and the coatings were applied in intervals throughout the construction process.

UNUSUAL FACTORS/CHALLENGES:

- The coating was applied to the underside of the recycled shipping containers before the encompassing structure was built around the ponds. Temperatures soaring into the triple digits and high winds were often a factor in the coating process.
- Because the building was under construction, the Dragon Spray Systems crew had to work around other trades and keep to a tight schedule while prepping and spraying.
- SPI coatings can adhere to polymeric substrates (e.g., existing coatings), allowing for easy tie-ins during the various coating application intervals.

MATERIALS/PROCESSES:

- Prepped concrete surfaces with Blastrac shot blasters and hand tools in areas inaccessible to the shot blast equipment
- Applied SPI's PolyPrime-100, a 100 percent solids urethane primer, over all concrete floor surfaces
- Applied SPI's HT-100F Polyurea in a custom blue color to the interior of all surfaces in each pond at a thickness of approximately 80 mils (2,032 microns)
- Applied SPI's Ultra Bond-100 polyurea in a sand color to the exterior surfaces of all ponds and onto floor surface areas at a thickness of

60 mils (1,524 microns) to create a monolithic, watertight membrane
- Applied SPI's EP-100, a 100 percent solids penetrating epoxy primer, over steel surfaces
- Applied SPI's Envelo-Seal 3-lb. (1 kg) spray polyurethane foam to level out irregularities in areas of the ponds and bio-reactor areas
- Injected and shoved smooth SPI's Synergy Series EPL-1.5 Crack Fill polyurea into each prepped concrete control joint

SAFETY CONSIDERATIONS:

- All standard safety procedures were followed on the job.
- The crew was supplied with full fresh air and wore cartridge respirators, Tyvek suits, and gloves at all times during spray application.

CRANES, HEAT, AND TRADES

One of the more unique aspects of this job was that the five-man Dragon Spray Systems crew sprayed the undersides of the 44 recycled shipping containers with SPI's Ultra Bond100 polyurea before the encompassing structure was built. "The containers were on custom-made riser platforms and then craned into position. The building was then constructed around the ponds," said Zettell. "There was a three- or four-day period during all the movement that everyone except the crane crew was asked to clear out of the jobsite."

Before the shipping containers were moved into place, however, there was one other challenge that the crew faced. Temperatures in the Nevada desert often soared well into triple digits, and at times, high winds put a temporary halt to the work. "High temperatures and high winds played a role in worker fatigue and challenged us as far as keeping to the schedule," shared Zettell. He is quick to point out that worker safety was the number one priority. His crew was supplied with full fresh air and wore cartridge respirators, Tyvek suits, and gloves at all times during spray application.

Another factor that the crew had to consider, both from a safety and a logistical standpoint, was working around other trades. Once the ponds had been put into place, the construction of the building began. Of course, this meant that the crew had to coordinate spraying around the construction, but it also meant that there was little room for error when it came to the application schedule. "The spray application occurred in intervals over six months. However, anytime we were spraying, we had to be thinking about what trade was coming in next. In some cases, we had electrical and plumbing trades that were right behind us," explained Zettell.

STRESS-FREE SHRIMP

With the ponds in place and the construction of the building underway, the crew got busy with the business of applying the polyurea coating system to the interior of the ponds. As previously mentioned, each of the ponds was formed from recycled shipping crates and are approximately 40 square feet (4 m^2). According to Zettell, each container, while having approximately the same dimensions as the others, was unique.

"An interesting thing to note is that depending on the country of origin of the shipping container (the United States, Canada, or China), the dimensions were slightly different. Each container had its own unique internal irregularities," said Zettell. To this end, prior to the coating application, some areas inside the containers were leveled out using SPI's Envelo-Seal 3-lb. (1 kg) spray polyurethane foam. "Spray polyurethane foam was applied in some areas of the ponds and also in some of the bio-reactor areas to fill in irregularities. The polyurea coating was sprayed over the foam and adjoining substrates, resulting in a monolithic, watertight polyurea membrane," said Zettell.

Then the interior of each pond was coated with 80 mils (2,032 microns) of SPI's HT-100F polyurea in a custom blue color using Graco HXP2 and EXP2 proportioners. "The specific blue color of the coating is as close to the color of the shrimp's habitat in nature as we could get, making the shrimp less stressed. This specific polyurea formula was chosen because the reactivity profile allows for texturing of the polyurea surface. This texturing of the polyurea results in an increased surface for more bacteriological growth," explained Zettell. And, according to Zettell, more bacteriological growth means more food (i.e., algae) for the shrimp.

ABOVE ▲ The facility also houses 5-foot by 30-inch (2m x 76 cm) tubes to grow algae to feed the shrimp. The coatings, which are abrasion resistant, can withstand the daily cleaning of the facility.

KEEPING IT CLEAN

While bacteriological growth is a good thing for inside the shrimp ponds, it is a very bad thing for the exterior and the floor of the building. This is one of the reasons why Zettell chose SPI's Ultra Bond-100 as the coating system for all exterior pond surfaces and all floor surface areas. "We tied the shipping containers into the new concrete slab. In addition to the concrete, the polyurea was applied over various substrates in the building — steel, marine-grade plywood, spray polyurethane foam, and geo-textile fabric. This created a monolithic membrane of polyurea through the entire farm. It is a seamless surface with no cracks or crevices in which to harbor bacteria," said Zettell. The Ultra Bond-100 is also abrasion resistant, which provides a durable surface that can withstand the sanitizing and cleaning that occurs on a daily basis in the aquaculture facility.

This particular property of the coating system is especially important in the algae room of the shrimp farm. This room houses 5-foot by 30-inch (2 m x 76 cm) tubes where the desirable algae can grow. "This room needs to remain extremely clean. An ozinating system is used in conjunction with high-pressure washers to keep the room sanitized and clean," stated Zettell.

IT'S ALL TIED IN

Before the Dragon Spray Systems crew applied the Ultra Bond-100 to the concrete floor surfaces, they prepped the substrate using Blastrac shot blasters and hand tools in areas that were inaccessible to the shot blast equipment. The crew then used SPI's portable Synergy Series LPG proportioner and its joint fill wand assembly to inject each prepped concrete control joint with EPL-1.5 Crack Fill polyurea. "The lightweight LPG proportioner can be transported in the back of a small truck bed, trailer, or ATV [all-terrain vehicle]. In the case of this project, it took one person for the concrete joint fill application. The entire equipment package was maneuvered on a small hand cart," said Dan Helton, president of SPI. After

BELOW ▼ The exterior of the ponds and the floors received a 60-mil (1,524 micron) layer of sand-colored polyurea. Applying polyurea over all substrate types helped create a monolithic membrane.

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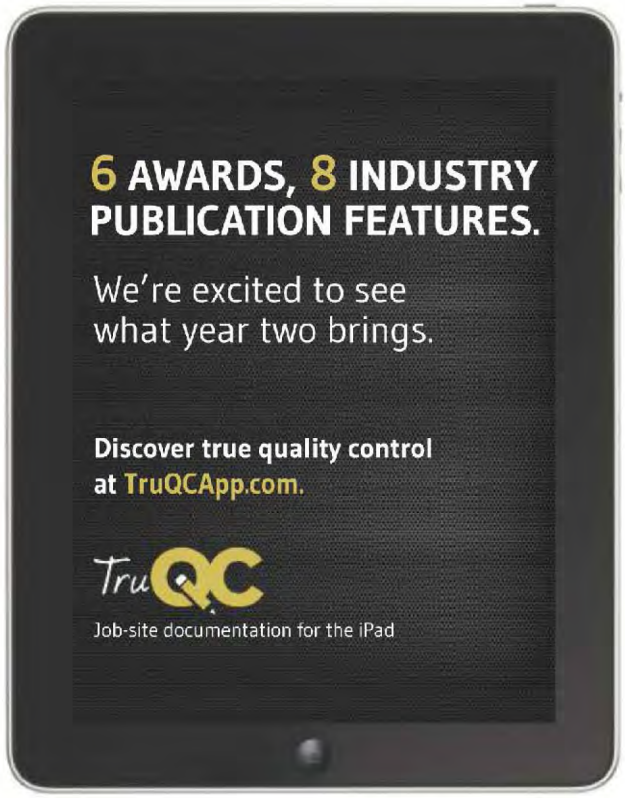

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ABOVE ▲ After the surfaces were coated, the crew injected Crack Fill polyurea into prepped concrete joints. And after six months, the shrimp pond project came to an end.

ABOVE ▲ Zettell sees this shrimp farm as one of his most memorable and successful jobs. It might seem like a desert mirage, but in Vegas even the most unusual situation can be possible!

approximately 30 minutes, the crew shaved the fast-setting polyurea joint fill material to be even with the adjoining concrete surface.

The crew then applied PolyPrime-100, a 100 percent solids urethane primer over all concrete floor surfaces. All steel surfaces, including floor trench drains, were primed with SPI's EP-100, a 100 percent solids penetrating epoxy primer. Using Graco HXP2 and EXP2 proportioners, the crew applied the sand-colored Ultra Bond-100 at a thickness of 60 mils (1,524 microns). "In some of the high vehicular traffic areas, we applied the Ultra Bond-100 at a thickness of 80 mils [2,032 microns]," said Zettell.

With the coating process taking place over a six-month time period, tying in to the existing coating could have presented a considerable challenge in terms of both time and money. That's where SPI's Ultra Bond-100 polyurea technology comes into the equation. "Ultra Bond-100 has the unique advantage of creating superior adhesion to most organic and inorganic substrates both new and old, without primer or extensive surface preparation. Applicators can recoat or 'tie into' old coatings beyond the recoat window, without manual surface preparation, applying a primer, or painstakingly removing the old liner," said Helton. Zettell agrees, and according to him, it was the Ultra Bond-100 technology that significantly reduced project labor and material cost on the job. "It was also a huge factor in keeping the project on schedule," said Zettell.

SUSTAINABLE SUCCESS

When all was said and done, the Dragon Spray Systems crew applied SPI's polyurea coatings to a total of approximately 76,400 square feet (7,098 m^2) of substrate in the aquaculture facility. For Zettell, the shrimp farm ranks as one of his most memorable and most successful jobs. He also sees it as a project that truly highlights the advantages and characteristics of polyurea coatings, specifically SPI's polyurea technology.

"Typically, when you spec out a job, there are certain properties of polyurea that make it a good coating system choice. In this particular job, all of the characteristics of SPI's polyurea were a perfect fit. From the color retention required for the shrimp in the interior of the ponds to the abrasion resistance necessary on the floor of the building, this project was really a dynamic use of polyurea," said Zettell. CP

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