Top 10 questions about Concrete Floating Docks

BY ROBERT WILKES

In recent years, many marinas across the country have been installing concrete floating docks. The question most marinas want answered is: What's behind the choice of concrete floating docks? Here are the Top 10 questions asked about concrete floating docks:

1. Many people who've experienced standing on a concrete floating dock say, “It feels like solid ground.” Why are concrete floating docks so stable?

Craig Funston, a structural engineer with the engineering and design firm Red Point Structures in Bellingham, Wash., explains the science behind the design.

He says the perception that a person gets of standing on solid ground is “a common reaction when anyone steps on a concrete floating dock for the first time.” Funston says, “The modules float high on the water, but they are massive, and they have a wide footprint.”

“Think of a floating dock as a snowshoe,” he explains. “The footprint is very broad compared to the weight it supports, so the water easily resists the load. Because each module is connected to the next, it multiplies the mass and footprint by the number of modules, making the entire system extremely stable and solid.”

The strength of the “snowshoe effect” can be seen at Port Forum, a super yacht marina in Europe that features a concrete floating dock. Here, the yacht owners carry their Mini Coopers (see photo below), on the decks of their yachts.

At Port Forum, cranes lower the automobiles onto the finger piers without jeopardizing the freeboard or stability of the docks.

2. Will concrete floating docks help me comply with environmental regulations?

Let’s be clear: concrete floating docks and pilings may look void of life, but they are home to an amazing biodiversity. Concrete has a high carbonate content, much like natural submerged rock. Large floats and tall pilings provide an attractive surface for colonization by many types of marine organisms.

In an environmental study of a concrete floating marina in Florida, biologists found a “meadow” of mixed algae, barnacles, feather duster worms, sponges, oysters, mussels, shrimp, and crabs living on the sides of the floats.

The algae and other sea life help filter and clean the water by absorbing dissolved nutrients. This was especially helpful at the location studied because the marina basin received storm runoff from the land above. In most situations, sites with runoff will experience murky or clouded water. However, the presence of bi-valves or other filter feeders can help minimize the effects of storm water runoff.

3. In case of a marina fire, is there an advantage to having concrete floating docks?

The simple answer is “Yes.” Once a boat is fully involved in a fire, the intense heat of burning fiberglass makes it difficult to extinguish. As firefighters note, it’s hard to locate and attack the fire’s core from the outside of a boat due to the boat’s many compartments. As a result, once the fire department arrives, it’s usually not a question of saving the burning boat, but rather how to save all the other boats in the marina.

In February 2006, the San Diego Fire Department spoke highly about concrete floatation after a nighttime marina fire at the Marriott Hotel Marina. In interviews with the firefighters at the scene, they mentioned several factors related to the concrete-float design that helped them limit the fire to a defined area.

Concrete will not burn like wood or sag or collapse like aluminum truss structures that can anneal in the heat of a fire. Less obvious is the real benefit of continuous concrete floating docks—they are a fireproof barrier against burning liquids spreading the fire.

Second, scrambling firefighters...
Firefighters in San Diego appreciated the stable, non-flammable platform from which to fight the fire. They could work from the docks because they provided a steady platform. With 70 lbs. of equipment on their bodies, firefighters fear falling into the water, which is a real and present danger. Having a stable platform from which to fight the fire and manage high-pressure hoses is critical to the success of the fire-fighting efforts.

It's been said that the water around these concrete floating docks is calm. Is this a myth?

Without getting too far into hydrodynamics, the inside of a floating concrete marina is virtually still—i.e. calm—because most of the time the approaching wave “sees” the float as a solid wall.

In a properly designed marina, most of the waves that approach the marina will be relatively small and of short frequency. That is, the time between one wave and the next is brief, barely one or two seconds. The float’s design geometry and inertia dissipate or absorb virtually all of the wave energy leaving the waters inside the marina calm. The float is not a solid wall, but the effect is nearly the same.

Judging from the exterior, concrete floats look as if they have a simplistic design. What’s taking place on the inside?

Stan Reimer, manager of corporate manufacturing for Bellingham Marine of Bellingham, Wash., has manufactured a lot of concrete floats, and nothing makes him more upset than people who say they are just blocks of concrete. “There’s a lot of skill and precision that goes into making a float,” Reimer says.

Reimer, who is involved with plants worldwide such as the one in Ferndale, Wash., that is currently turning out onepiece fingers up to 70 ft. long for the Shilshole Bay Marina renewal in Seattle, says working with concrete is quite complex.

“I can’t get into the design because it’s proprietary,” Reimer noted, “but concrete is actually a delicate material to work with. It takes a very experienced team of workers to construct the forms and internal workings of the float and prepare it for the pour. The reinforcing bar and mesh, utility runs, custom features, and expanded polystyrene must be installed to exacting tolerances and standards.”

“In the end it’s worth it,” Reimer says. “When those modules come together and form a marina, the uniformity and symmetry of the whole is beautiful.”

So how can a concrete floating dock marina be considered flexible?

Although the concept that concrete is flexible is counterintuitive, it’s true. Concrete’s flexibility derives from its component design. Well-designed systems use three basic components: the float, the structural waler, and the through rods.

Think of Lego blocks. Working with these three components, one can reconfigure a marina and move finger piers around relatively easily. In many cases, the pilings don’t have to move at all, or very few of them have to be repositioned.

The Olde Naples Seaport, formerly known as the Coconut Grove Marina in Naples, Fla., is a good example. Originally built with 40- and 60-foot berths, the operators saw the longer berths sell out more quickly than shorter length ones. To capitalize on these market changes, the owner remodeled the marina to create 60- and 80-foot berths. Few piling positions were changed, and the cost of the remodel was one-third of what it might otherwise have been, and most importantly, the marina now has large berths for its large boat customers.

A flexible concrete system will also allow for non-opposing fingers. From a design standpoint, this is a great benefit. One may have a 30 ft. berth on one side of the main walk, and a 40 ft. berth on the other. Flexibility in configuring slips allows owners to optimize the space in the basin and the slip mix.

Where do the utility runs go?

Marinas with concrete floating docks will find their buried utilities are safer than other style docks, just as neighborhoods with buried utilities are more safe and reliable to live in. Built-in utili-
ities are resistant to damage and need little or no maintenance.

Placing the utilities on the inside of floats can help prevent fatigue failures from constant bending motion, but here is a case where not all floating docks are the same. When modules are connected by hinges, constant flexing can occur. When the modules are unitized, as they are in a structural water system, the connecting points flex very little.

Internal utility runs may include electrical power in primary and secondary voltages, potable water, wet and dry fire lines, CATV, CAT 6, fiber optics, telephone, sewer systems, natural gas lines, and even a compressed air system for boatyards. Whatever the operator wants can probably be run inside the floats.

A marina in China selects Premier Floats for dock support

A new marina development in Dalian, China, features docks supported by Premier Materials. As part of a large commercial development, the Starbay Yacht Club opened in Fall 2006. Premier's floats not only support the docks, they also help the environment. While traditional floats were made of blocks of foam that flaked into the water as they aged, Premier's products are fully encased in plastic. This means that even as the years add up, the foam is never exposed to water, so there's never any danger to the water and its wildlife.