

Scott Kingdoms of the Seas Aquarium

Henry Doorly Zoo, Omaha, Nebraska



Project Statistics

Area:	71,000 SF
Completion Date:	1995
Construction Cost:	\$15.8 Million

Major Program Spaces

- o Total of 20 displays
- o 1.2 million gallons of water
- o Tropical reef and shark tank
- o Penguin display
- o Gift shop

An award-winning project...

American Consulting Engineers Council,
Nebraska Chapter (ACEC/N), 1996
Engineering Excellence Grand Award

National Society of Professional
Engineers (NSPE), Eastern Chapter,
1996 Outstanding Engineering
Achievement Award



Alvine Aquatics' design services began with two years of research prior to design by touring aquariums across the country to investigate the successes and failures of life support systems.

Built on the site of the existing aquarium, the three-story structure is approximately 15-times the size its predecessor. Some of the original aquarium's existing concrete tanks were relocated to the new structure and fitted with new life support systems.

Hundreds of miles from any ocean, this project required creative and original design concepts to manufacture seawater and recreate the wide variety of ocean environments. The design team researched and developed new approaches in water management systems to efficiently and effectively sustain critical life support.

From balmy tropical coral reefs and Amazon rain forest to penguin playgrounds in the Antarctic, this facility displays them all.

Tropical Coral Reef and Shark Tank

- o 17-foot-deep/450,000 gallons of 75° F saltwater display tank for sharks and reef fish
- o The nation's largest underwater tunnel (70' long, 13' high)
- o A reserve tank contains another 400,000 gallons for a display re-circulation system to keep water clean and clear
- o Twelve 40-hp pumps recirculate the water with an unusually low tank turnover rate of once every 1/2 hour
- o Ozone injection systems with five minutes of contact time for disinfection and clarity
- o Compressors blow air onto surface for aeration, water movement and camouflage of systems



Scott Kingdoms of the Seas Aquarium

Henry Doorly Zoo, Omaha, Nebraska

Penguin Environment

- Enclosed, refrigerated exhibit, with air and water temperatures of 30° F
- 60,000-gallon swimming pond and snow, for survival and comfort of 60 Antarctic penguins
- Ozone water treatment provides excellent water quality and clarity
- Snowmaking capabilities help to keep surfaces clean and healthy
- A reserve and recirculation tank with 95,000 gallons of water
- Three, 3-ton and one, 5-ton ice-flake machines producing 14 tons of man-made snow per day
- Two, 30-ton electric chillers duplicate Antarctic temperatures
- Dual air handling units contain odors and isolate cold air from other exhibits
- Simulation of the light cycles of the South Pole (opposite of local seasons) by using an astronomical clock, controls and several lamp types

Other Displays

- Separate tanks house octopuses, jellyfish and schooling fish
- The flooded Amazon rain forest exhibit, with its mangrove swamp, houses aquatic life while toucans and monkeys roam branches above water
- 45° F temperatures of the air and 25,000 gallons of water in the puffin exhibit

Mechanical Systems

- Water purification utilizing uniquely-designed ozone injection system
- Standard-setting process and automatic control of water clarity and the 24-hour-a-day ozone disinfection. No other facility leaves these controls unmanned in the automatic mode
- Each of the 20 displays is self-contained, with its own individual and concealed support systems (filtration, disinfection, recirculation, plumbing, HVAC, lighting, emergency power) and reserve tank
- Unparalleled water reserve capabilities for treatment of "sick" exhibits
- "Over-designed" systems for redundant capacity in water reserves and pumping capabilities
- Building automation monitors/controls the pumping/flow of systems for filter backwash reclamation, filtration, ozone disinfection
- Water management system requires eight miles of piping and 70 pumps to operate and includes:
 - Reverse osmosis system for purification
 - A brine system to make seawater by adding salts
 - Sand filtration for recirculated water
 - Continuously tempered water for each exhibit's specific requirements
- MEP system components (filters, tanks and pumps) are constructed of fiberglass, PVC or epoxy to avoid deterioration from saltwater

Electrical Systems

- Electrical wiring was installed in PVC conduit
- Exact simulation of Antarctic daylight in terms of intensity, quality and time cycles for penguin breeding (several eggs have been laid over the past few seasons.)
- Entire aquarium is safe-guarded with a 600 kW generator for an emergency life support system

