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AQUATICS FOR LIFE

Swimming Pool Technologies:
Are these the Answer?
EH2O Recreational Water
Virtual Conference

OVERVIEW

- REASONS FOR ADVANCEMENT
- POOL SYSTEMS TECHNOLOGIES
- COMPETITIVE SWIMMING TECHNOLOGIES
- RECREATIONAL SWIMMING TECHNOLOGIES
- WELLNESS SWIMMING TECHNOLOGIES
- NATURAL POOLS

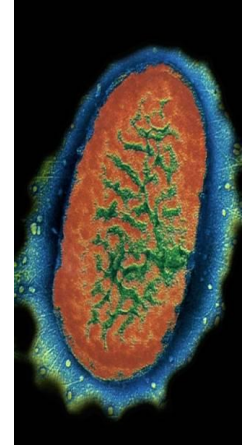


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HAZARD TYPES

- Physical
- Microbiological
- Chemical



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ISSUE: SUCTION ENTRAPMENT

80 REPORTS OF MAIN DRAIN ENTRAPMENTS
IN THE U.S. FROM 1999-2008 RESULTING IN
SERIOUS INJURY OR DEATH

INDIVIDUALS IN THE 5-9 YEAR-OLD AGE
GROUP HAD THE HIGHEST FREQUENCY OF
ENTRAPMENT REPORTS. 74% OF THE
REPORTED CASES ARE CHILDREN UNDER
THE AGE OF 14.

INDIVIDUAL LAWSUIT JUDGMENTS OVER
\$100 MILLION U.S.

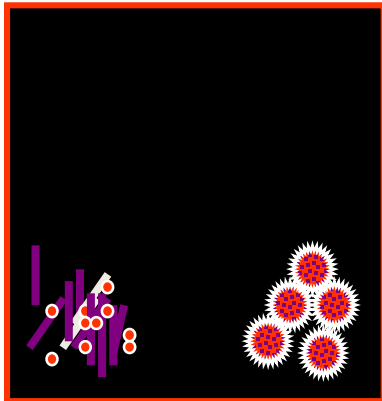


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ISSUE: RWI'S

PATHOGENIC BACTERIA, VIRUSES AND PROTOZOA IN SWIMMING POOL WATER REPRESENT POTENTIAL RISKS TO PUBLIC HEALTH

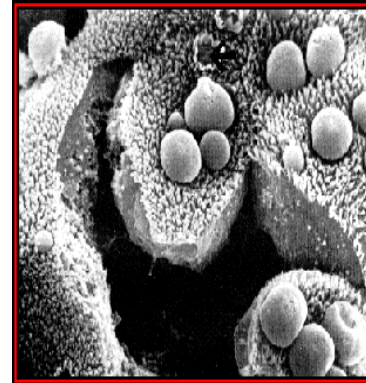
Bacteria
(E.coli)



Viruses
(Hepatitis, Polio)



Protozoa
(Giardia)(Cryptosporidium)



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ISSUE: COMBINED CHLORINE IN POOLS

A 2009 SURVEY BY THE WATER QUALITY AND HEALTH COUNCIL (WQHC) IN THE UNITED STATES REVEALED THAT:

- 17% OF BATHERS URINATE IN SWIMMING POOLS.
- 83% OF BATHERS DO NOT SHOWER BEFORE SWIMMING.
- 63% ARE UNAWARE OF ILLNESSES ASSOCIATED WITH SWALLOWING, BREATHING OR HAVING CONTACT WITH CONTAMINATED POOL WATER.



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POOL SYSTEM TECHNOLOGIES



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Filtration

Future

High Rate Sand + New Technology

- Air assisted backwashing
- Old technology with a new application
- Goal of 20% water usage

Modified Filter Bed: Polymers

- Crypto 3 log reduction

Flocculent Additives

- PRS
- Improves ability to capture pathogens

Regenerative Media

- New technologies
- Greater efficiencies
- Media quality



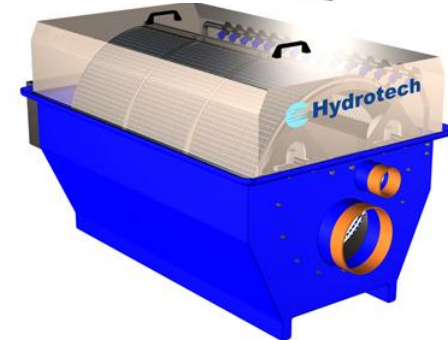
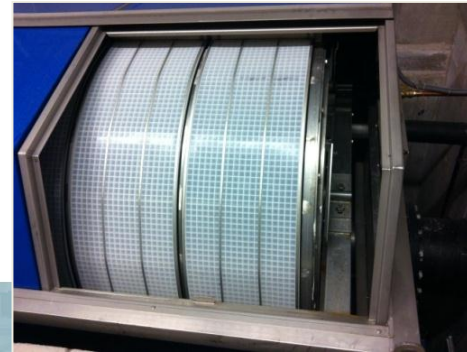
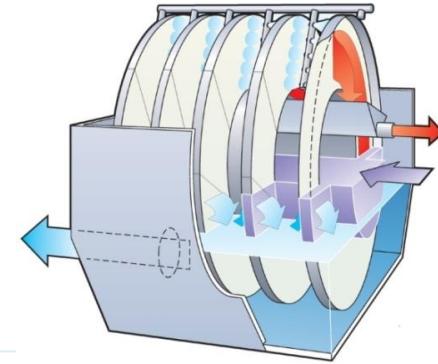
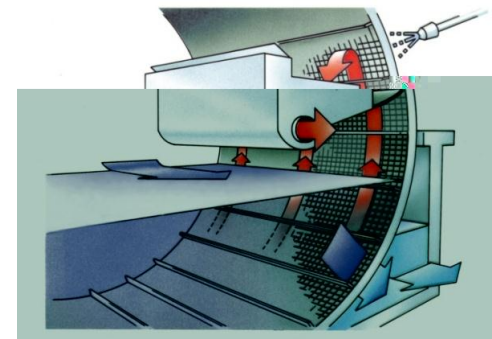
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Filtration

DRUMFILTERS

- Membrane Filtration
- Gravity Flow
- Reduced Energy
- Expels backwash every 15 minutes



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Sphagnum Moss

Dr. David Knighton, M.D.

Atlantic Monthly article

- WWI war wound treatment
- Native American uses
- Vikings
- Attributed the increased survival to absorption of fluids by dried moss
- Effect could only be attributed to anti-microbial activity

Review Medical Articles

- Used Sphagnum Moss from Northern Minnesota and Europe



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SPHAGNUM MOSS – LEISURE POOL

Week of Test/Date of New moss addition	10/31- 11/7/2013	11/12/2013	12/12/2013- 12/19/2013	1/16/2014- 1/23/2014	2/6/2014- 2/13/2014
Moss In/Out	Out	In	In	In	In
Moss Added/Changed		11/12/2013	12/18/2013		
Buckets of briquettes used (50 lbs.)	2.5		0.75	0.87	0.5
Lbs. of CO2 used	460		246	225	441
2013 Pulsar Cost/bucket	\$ 112.50		\$ 112.50		
2013 CO2 Cost/lb.	\$ 0.29		\$ 0.29		
2013 Weekly Pulsar cost	\$ 281.25		\$ 84.38		
2013 Weekly CO2 cost	\$ 133.40		\$ 71.34		
2013 Weekly Total Cost	\$ 414.65		\$ 155.72		
2014 Pulsar Cost/bucket				\$ 130.00	\$ 130.00
2014 CO2 Cost/lb.				\$ 0.31	\$ 0.31
2014 Weekly Pulsar cost				\$ 113.10	\$ 65.00
2014 Weekly CO2 cost				\$ 69.75	\$ 136.71
2014 Weekly Total Cost				\$ 182.85	\$ 201.71
2013 Monthly Pulsar cost*	\$ 1,205.27		\$ 373.66		
2013 Monthly CO2 cost	\$ 571.71		\$ 315.93		
2013 Monthly Total Cost	\$ 1,776.99		\$ 689.59		
2014 Monthly Pulsar cost*				\$ 500.87	\$ 260.00
2014 Monthly CO2 cost				\$ 308.89	\$ 546.84
2014 Monthly Chemicals Total Cost				\$ 809.76	\$ 806.84
Daily Chemical Cost w/o Moss	\$ 59.23		\$ 59.23	\$ 59.23	\$ 59.23
Monthly Chemical Cost w/o Moss	\$ 1,776.99		\$ 1,836.22	\$ 1,836.22	\$ 1,658.52
Estimated Chemical savings with moss in			\$ 1,146.62	\$ 1,026.46	\$ 851.68
Projected Monthly Cost of Moss			\$ 451.50	\$ 451.50	\$ 451.50
Projected Savings Including Moss Cost			\$ 695.12	\$ 574.96	\$ 400.18
Actual Savings Including the Cost of Moss			\$ 1,146.62	\$ 574.96	\$ 851.68



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SPHAGNUM MOSS – THERAPY POOL

Week of Test/Date of New moss addition	2/13/2014- 2/20/2014	3/4/2014	4/24/14- 5/1/14	5/6/2014	5/29/14- 6/5/14	6/16/2014	7/16/2014	9/4- 9/11/2014	9/12/2014
Moss In/Out	Out		In	In	In	In	In	Out	In
Moss Added/Changed		3/4/2014		5/6/2014		6/16/2014	7/16/2014		9/12/2014
Buckets of briquettes used (50 lbs.)	0.25		0.38		0.18			0.38	
lbs. of CO2 used	112		298		134			152	
2014 Pulsar Cost/bucket	\$ 119.50		\$ 119.50		\$ 119.50			\$ 119.50	
2014 CO2 Cost/lb.	\$ 0.31		\$ 0.31		\$ 0.31			\$ 0.31	
2014 Weekly Pulsar cost	\$ 29.88		\$ 45.41		\$ 21.51			\$ 45.41	
2014 Weekly CO2 cost	\$ 34.72		\$ 92.38		\$ 41.54			\$ 47.12	
2014 Weekly Total Cost	\$ 64.60		\$ 137.79		\$ 63.05			\$ 92.53	
2014 Montly Pulsar cost*	\$ 119.50		\$ 181.64		\$ 86.04			\$ 181.64	
2014 Monthly CO2 cost	\$ 138.88		\$ 369.52		\$ 166.16			\$ 188.48	
2014 Monthly Chemicals Total Cost	\$ 258.38		\$ 551.16		\$ 252.20			\$ 370.12	
2014 Cost of Moss?		\$ 193.50		\$ 193.50		\$ 193.50	\$ 193.50		\$ 193.50
Chemical Savings									

Clear Comfort

Advanced oxidation process

- Hydroxyl radicals
- Secondary disinfection

Crypto reduction (99.99% in <1 hour)

Improves air quality

Reduces CL2 usage

- Low to no CL2 needed

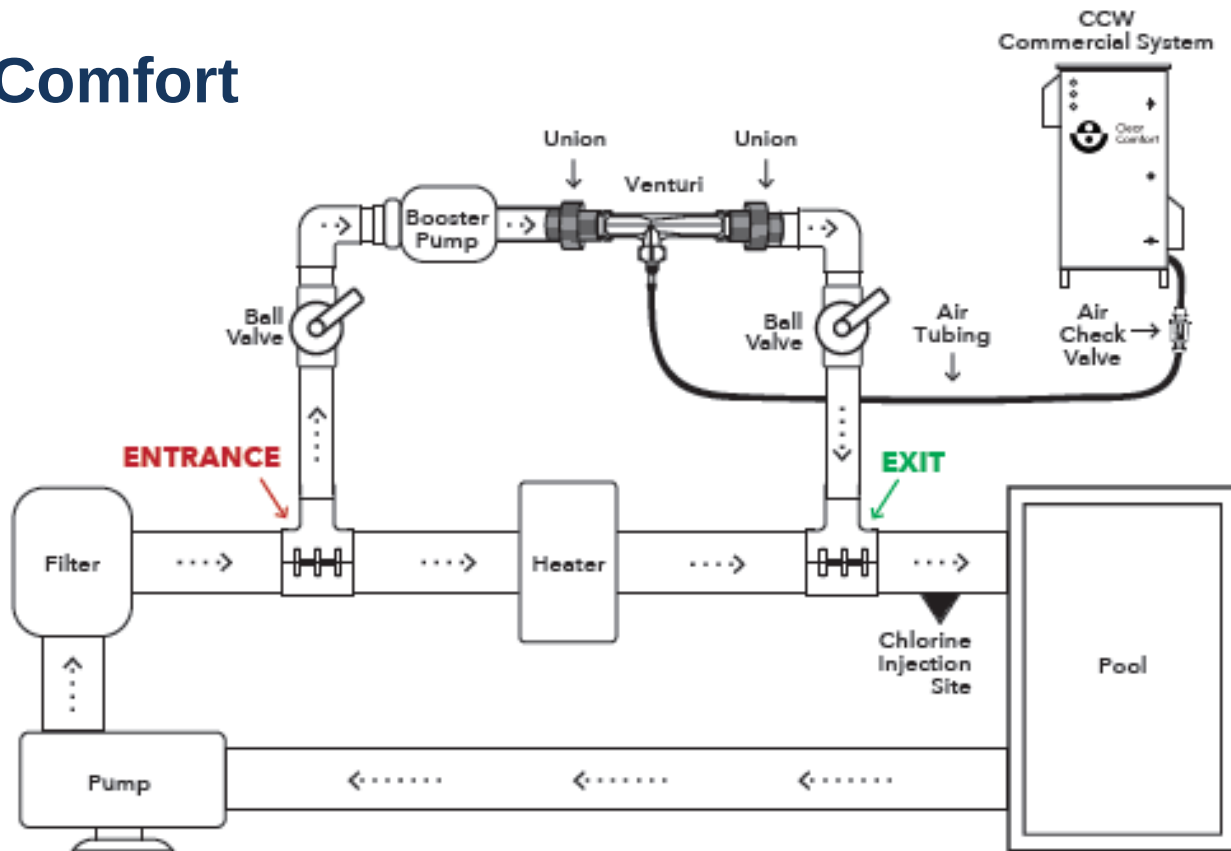
Less expensive than UV

- Initial Cost and annual maintenance



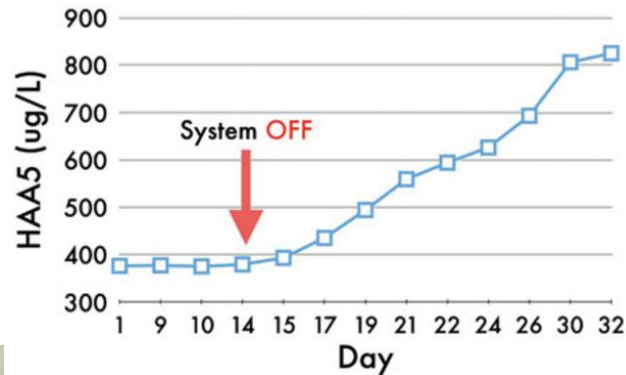
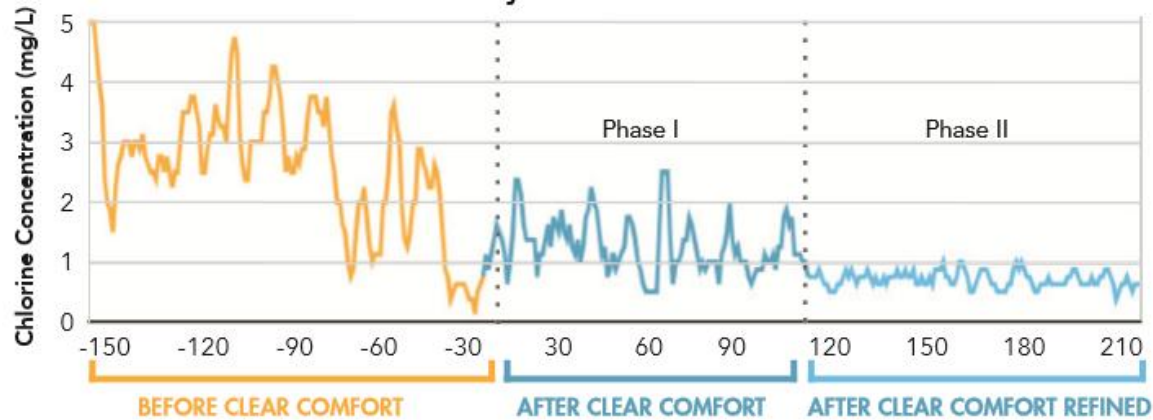
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Clear Comfort



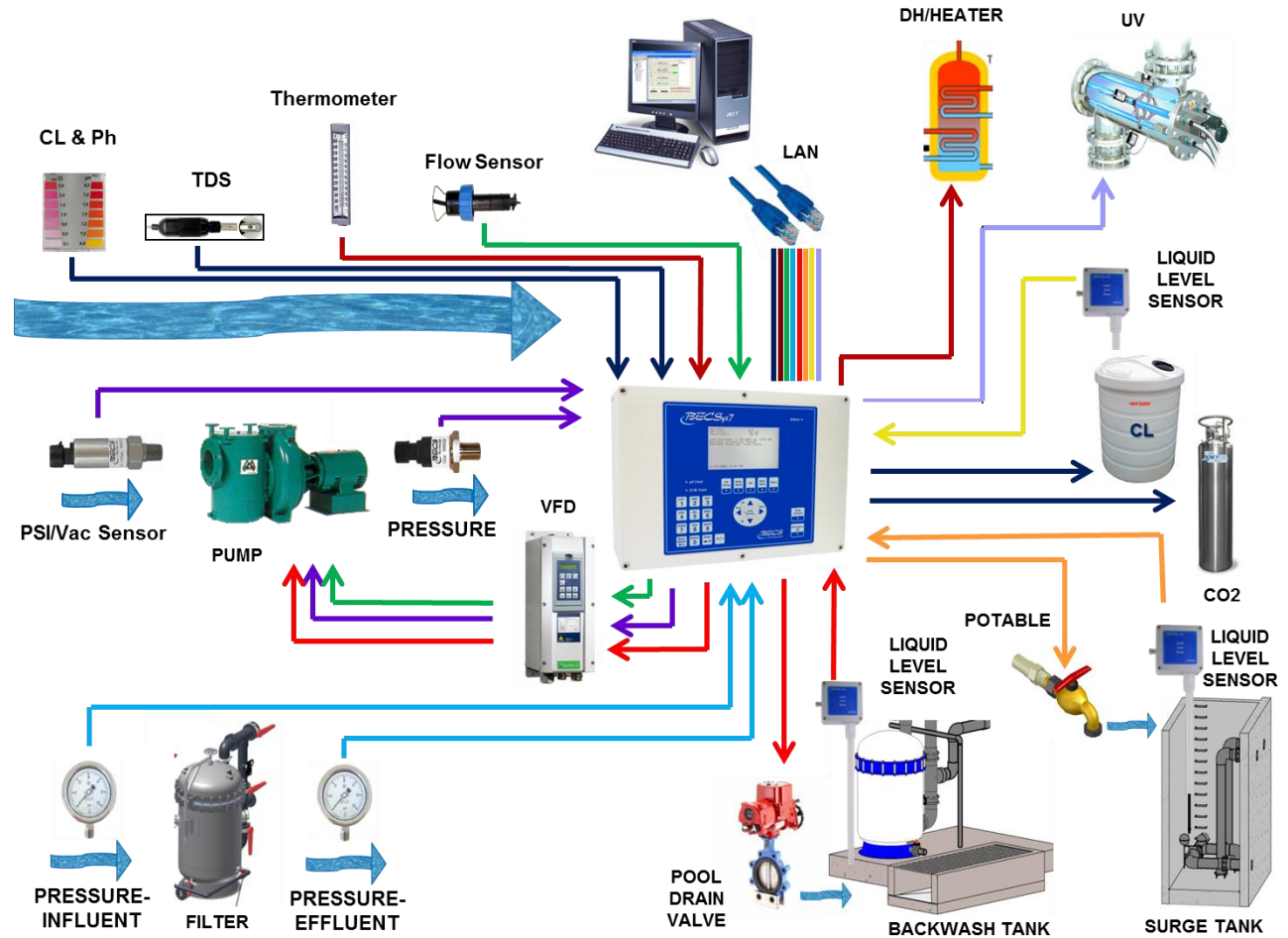
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Clear Comfort – Case Study



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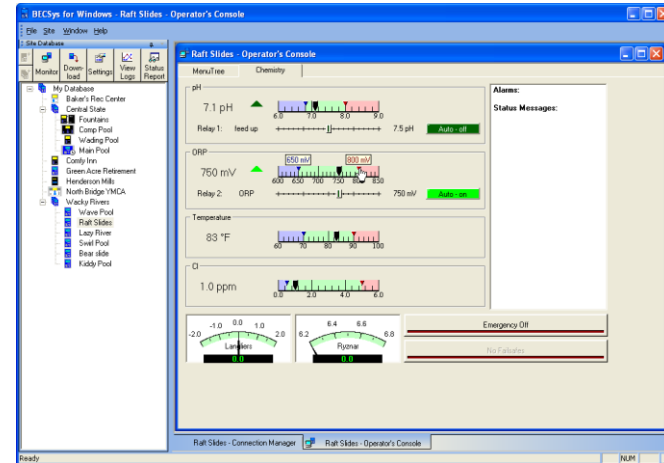
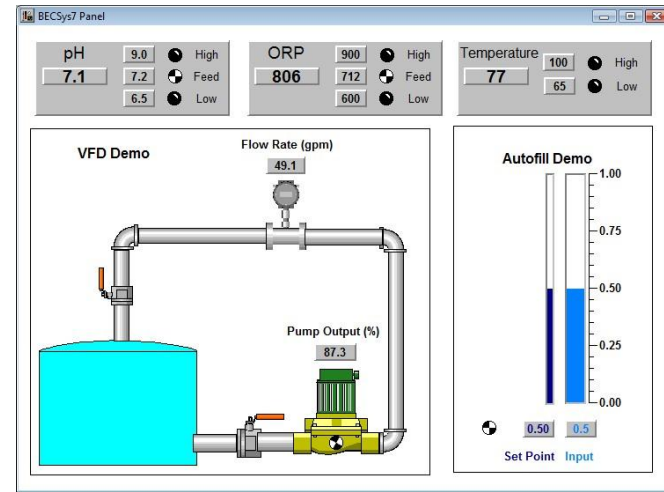
CONTROLLER CAPABILITIES



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MODBUS TCP/IP

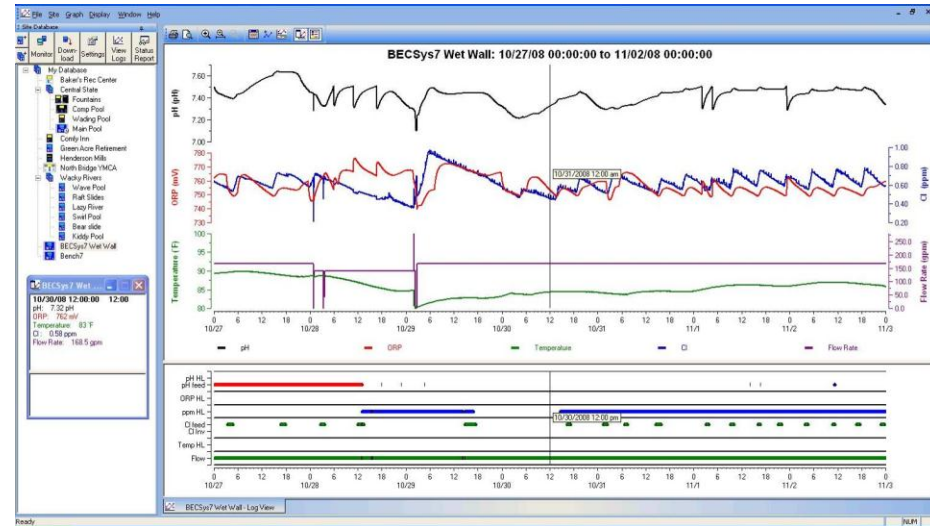
- Full Read/Write Access
- Nearly 200 parameters available
- pH, ORP, free Cl, temp, total Cl, combined Cl, flow rate, VFD, autofill, cond/TDS, chemical inventories, surge pit, etc.



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Advantages to Integration

- Common, user-friendly interface tailored to the aquatics industry
- Common access to data logs and parameters
- Integrated historical data logs
- Diagnostics
- Compliance
- Unified alarm notification
- On-site
- Remote, to service and/or management personnel



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VFDs on Air Handlers

- Air handler can use Combined CI value, along with other parameters (air temp, humidity, etc.), to manage air turnover during winter months
- Objective is to improve indoor air quality while conserving energy by minimizing amount of cold winter air that requires heating



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UV Control

- Combined Chlorine Set point
- User settable parameter
- When Comb Cl < Set Point, UV Turndown relay is activated
- Start Delay- If set, the time the Comb Cl must be below the Set Point before the UV Turndown relay is activated



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Variable Frequency Drives (VFDs)

- Significant Energy Savings
- Experience exponential savings from motor speed reduction
- 80% motor reduction can equate to approximately 50% energy savings
- Flow meter integration
- Constant monitoring and real time adjustment of recirculation rate
- Soft starting capabilities
- Ideal for water feature adjustments



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LED Underwater Lighting

- Significant energy savings
- Up to 85% over traditional incandescent lighting
- Increased life expectancy
- Up to 6 times compared to traditional pool lighting (Incandescent ~ 5,000 hrs; LED ~ 30,000 hrs)
- Cooler operation
- True white light
- Color changing capabilities



COMPETITIVE SWIMMING TECHNOLOGIES



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PRE-ENGINEERED POOLS

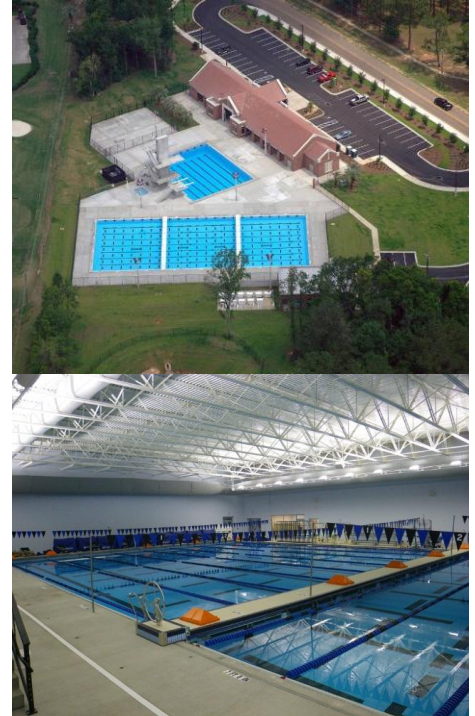
MANUFACTURERS

- MYRTHA (ITALY)
- ASTRAL (SPAIN)
- NATARE
- BRADFORD

Primarily used for rectilinear pool configurations (i.e. competition pools), but can be custom shaped to allow for curved sections of pool walls.



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PRE-ENGINEERED POOLS

HAS BEEN SEEN IN THE MARKET AS A VIABLE SHORT TERM INSTALLATION AS WELL AS LONG RANGE SOLUTION

- Temporary installations at high-capacity venues for competitions
 - Olympic Trials – Long Beach, CA and Omaha, NE
 - US Nationals – Indianapolis, IN
 - World Championships – Barcelona

COST CAN VARY WIDELY AND MAY BE DEPENDENT UPON THE CONTRACTOR AND MANUFACTURER

- 25% TO 50% PREMIUM OVER TRADITIONAL CONCRETE CONSTRUCTION

TYPICAL WARRANTY ON PRE-ENGINEERED SYSTEMS IS 15 YEARS

CAN HELP PROVIDE AN EXPEDITED CONSTRUCTION SCHEDULE



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PRE-ENGINEERED POOLS



SWIM MEETS

- MORE INFORMATION AVAILABILITY
- TIMING SYSTEM ABLE TO INTEGRATE WITH WEBSITES
 - EVENT WINNERS, RECORD BREAKERS
 - ALL TO SOCIAL MEDIA
- LIVE UPDATING HEAT SHEETS
 - MEET MOBILE APP
- ONLINE RESULTS
- DESIGN IMPACT: INTERNET & WIFI
 - PAN-AMERICAN GAMES IN GUADALAJARA USED 27 WIFI ACCESS POINTS
 - HAD ABOUT 4500 PEOPLE IN THE BUILDING.



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SCOREBOARDS

- RESULTS AND VIDEO
 - INSTANT REPLAY
- TURNS AN EVENT INTO AN EVENT
 - FOR SPECTATORS, NOT JUST ATHLETES
- TVS LOCATED THROUGHOUT THE FACILITY, PIPED IN AS REMOTE SCOREBOARDS
- TWITTER DISPLAY FOR EVENT HASHTAGS
- BRANDING AND SPONSORSHIPS



VIRTUAL TRAINERS

- **DESIGN CONSIDERATIONS**
 - POWER REQUIRED FOR SYSTEM
 - CAN BE PERMANENT
- **SYSTEM FEATURES**
 - LED UNDERWATER LANE LINES
 - PROPRIETARY HARDWARE AND SOFTWARE
 - IPAD/IPHONE CONNECTIVITY



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UNDERWATER CAMERAS

- **DESIGN CONSIDERATIONS**
 - TV MOUNTED ON POOL WALL
 - POWER REQUIRED FOR SYSTEM
 - REMOVE CAMERAS AND DVR DAILY
 - CAN BE PERMANENT
- **SYSTEM FEATURES**
 - UNDERWATER WIRELESS CAMERAS
 - SWIMMING CLOUD MANAGEMENT
 - IPAD CONNECTIVITY
 - PROPRIETARY HARDWARE AND SOFTWARE



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FANTASY SWIMMING APP

- SET YOUR “LINE UP” AND ROSTER BASED ON SWIMMERS AT YOUR SWIM MEET.
- PROVIDES MORE INTERACTION AND ACTIVITY FOR SWIMMERS AND SPECTATORS DURING A MEET

The screenshot displays the Podium Pursuit.com website. At the top, there's a navigation bar with links: HOME, STORE, MY LOCKER, MY TEAMS, HOW TO PLAY, MY ACCOUNT, and LOGOUT. The main header features the Podium Pursuit logo and the text "FINA World Cup - Rio". Below this, it specifies the location "Rio de Janeiro, Brazil" and the dates "September 10, 2010 12:00 PM - September 12, 2010 03:00 PM CDT, USA".

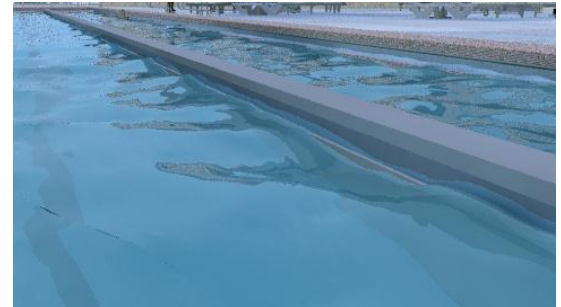
A section titled "Competition Events" shows a table of events with columns for Event, Gender, and Event Start Time. The events listed include Women's 800 Freestyle, Men's 100 Freestyle, Women's 200 Freestyle, Men's 50 Breaststroke, Women's 100 Breaststroke, Men's 400 Ind Medley, Women's 100 Butterfly, Men's 100 Backstroke, Women's 50 Backstroke, Men's 200 Butterfly, Women's 200 Ind Medley, Men's 400 Freestyle, Women's 50 Freestyle, Men's 200 Breaststroke, Men's 100 Ind Medley, Women's 200 Backstroke, Men's 50 Butterfly, and Men's 1500 Freestyle.

On the right side, there's a "Pursuit Bucks" section with a "Welcome!" message and links for "My Account", "Go To Store", "My Locker", and "Logout". Below this is a "UPCOMING COMPETITIONS" section listing events like FINA World Cup - Rio, XIX Commonwealth Games, FINA World Cup - Beijing, FINA World Cup - Singapore, and FINA World Cup - Tokyo, each with a "Play" button. Further down is an "ACTIVE COMPETITIONS" section stating "There are no active competitions". At the bottom right is a "HOT PRODUCTS" section listing items like USA Dome Cap, Men's Yellow Bulls-eye Jammer, Purple Metallic Race Maker Goggles, Gray Mask Goggles, and Women's Pink KneeSkin, each with a "Get One" button.



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INDIVIDUAL LANES



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RECREATIONAL SWIMMING TECHNOLOGIES



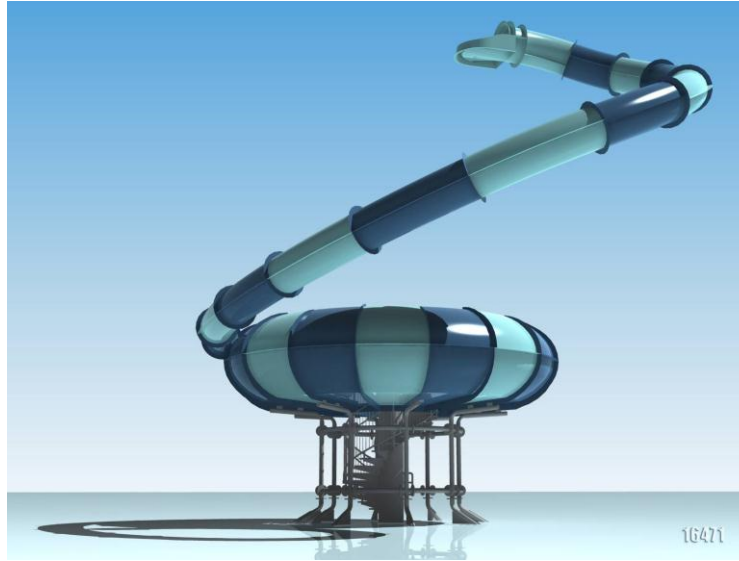
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Aqua Loop



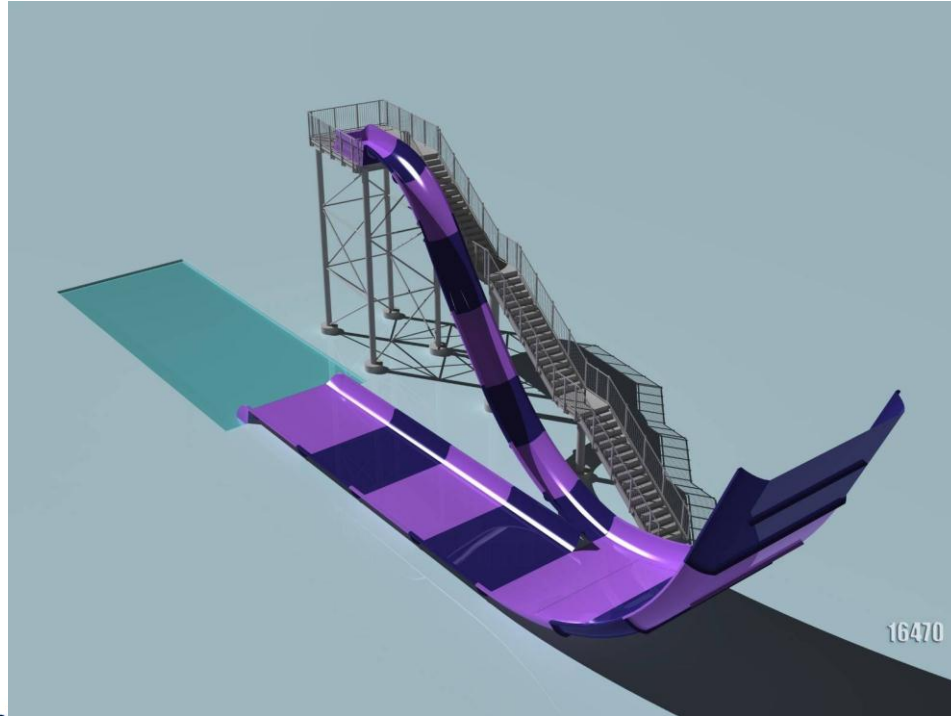
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Champagne Bowl



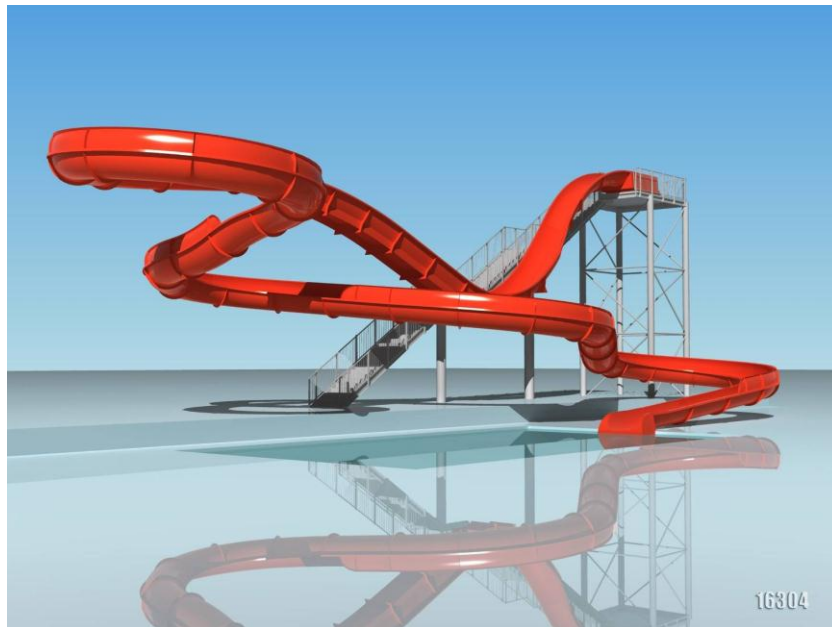
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Boomerango Express™



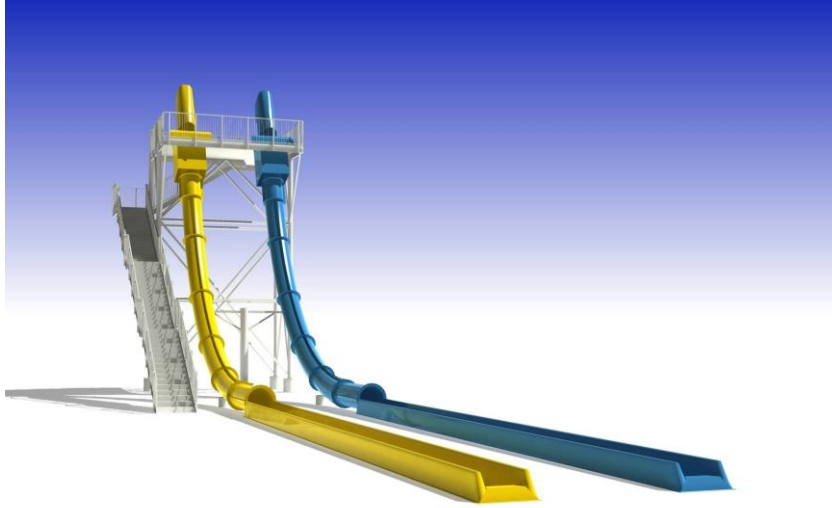
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MasterBlaster Express™



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AquaDrop



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SLIDEBOARDING

Waterslide and Video Game combined

Additional revenue generation

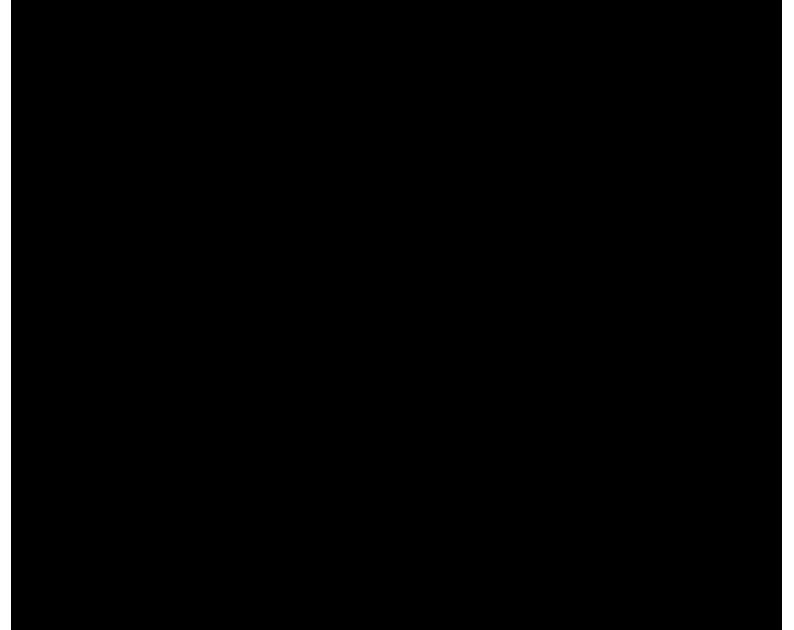
- Draws in teen population
- Allows you to capture their information
- Impromptu tournaments on low attendance days



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OFF-SEASON USES

- SKATEBOARD IN POOL
 - LAZY RIVER BEING USED FOR SKATEBOARDING
 - MAXIMIZE DOWN TIMES
- OBSTACLES
 - STAFFING ISSUES
 - ENTRANCE FEES



MULTI-PURPOSE FACILITIES

- ICE RINKS & POOLS MAKE GREAT PAIRS
 - IN CANADA, THESE ARE THE TWO MOST POPULAR INDOOR SPORT/ACTIVITIES
- NY PARKS CONVERTING TWO POOLS INTO WINTER ICE RINKS



MULTI-PURPOSE FACILITIES

- MCCARREN PARK POOL: FACILITY CASE STUDY
- BUILT IN THE 1936 & OPERATED AS A POOL UNTIL 1984
- LOCALS BEGAN TO USE THE POOL FOR OTHER PURPOSES:
 - OUTDOOR CONCERTS
 - ROLLER HOCKEY
 - DODGE BALL TOURNAMENTS
 - GATHERINGS
- CITY TURNED IT BACK INTO POOL IN 2012, WITH THE DESIGN INTENT FOR MULTI-PURPOSE FACILITY



MULTI-PURPOSE FACILITIES



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MULTI-PURPOSE FACILITIES



REUSING FACILITIES

- TROPICAL ISLANDS RESORT – GERMANY
- BUILT IN 1934 AS A FORMER GERMAN ZEPPELIN HANGER, IT IS THE “LARGEST FREESTANDING HALL IN THE WORLD”
- RENOVATED INTO INDOOR WATER PARK IN 2004



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REUSING FACILITIES

- AIR TEMP 79 °F & 64% HUMIDITY
- HOME TO THE BIGGEST INDOOR RAINFOREST IN THE WORLD
- SAND BEACH
- NUMEROUS POOLS
- BARS & RESTAURANTS
- HOTELS
- OPEN 24/7



CAMERAS & USERS

- VIDEO OF ON SURF MACHINE
- WATERSLIDE PHOTOS BEING TAKEN OF RIDERS AS THEY USE THE SLIDE
- PHOTO BOOTHS IN FACILITY
- ALL INTEGRATED INTO SOCIAL MEDIA



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ACTIVITY INTEGRATION

- TIMING ON WATER SLIDE RACES
- LIGHTS & BUTTONS ON CLIMBING WALLS
- SOCIAL MEDIA: DAILY WINNER, TIES TO FB PAGES OF USERS, FACILITY BRANDING



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RFID TAGS IN FACILITIES

- RADIO FREQUENCY ID (RFID) CHIPS ARE USED TO MONITOR USER'S ACTIVITY AND LOCATION IN FACILITY
- WAY TO PROVIDE AN "ID" FOR EVERY USER IN THE FACILITY
- CURRENTLY USED FOR LOCKER RENTALS



RFID

- DISNEY EXPERIMENT:
 - INTEGRATED WITH FASTPASS+
 - MOBILE/WEB ACCESS INTEGRATION TO DEVELOP “DAY PLANS”
 - HELPS TO LOCATE MISSING CHILDREN
- REQUIRES NEW INFRASTRUCTURE TO DEVELOP “CHECK IN POINTS” OR AN “IN GROUND GRID”



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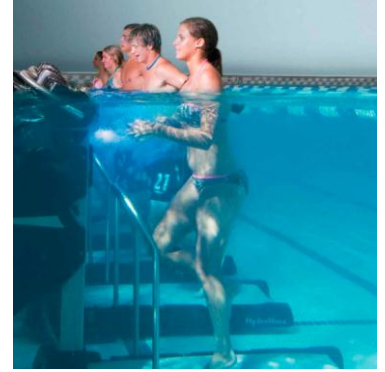
WELLNESS SWIMMING TECHNOLOGIES



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AQUATIC FITNESS

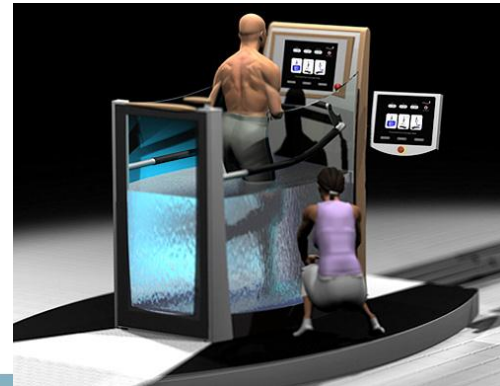
- TOOLS
 - TREADMILLS
 - BIKES
 - SWIM IN PLACE MACHINES
 - MOVEABLE FLOORS



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AQUATIC FITNESS

- REMOTE TEACHING & EDUCATION
- EXERCISE VIDEOS
- COMPARISONS TO REAL LIFE DISTANCES
 - HOW FAR YOU WALKED/SWAM?
 - SWIM THE ENGLISH CHANNEL
 - HIKED THE APPALACHIAN TRAIL
 - CLIMBED MT. EVEREST



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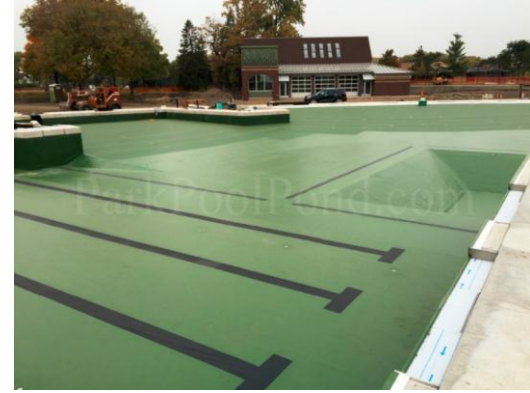
NATURAL POOLS



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NATURAL POOLS

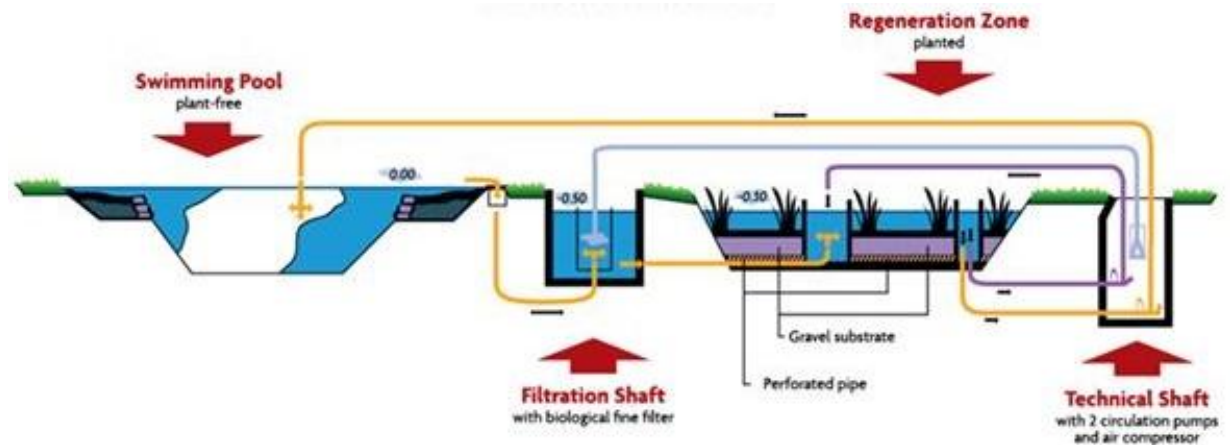
- Uses plants to clean the water naturally
- Popular in Europe- over 20,000 public and private NSPs



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FILTRATION PROCESS

- There are no chemicals used. Pool water flows through biological filters before reaching the regeneration basin
- In the regeneration basin, plants and gravel help cleanse the water
- Clean water is pumped back into the pool
- The entire volume of the pool water is recycled every 12 hours



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WHY AREN'T THERE MORE OF THEM?

Though the maintenance costs are lower and there are no chemicals used, it requires a larger footprint for the regeneration basin

Does not meet Health Code requirements in United States

- No residual in the water to kill bacteria before filtration
- In order for a natural pool to operate, there must be an exemption in the code for natural pools
 - Webber Pool- Minneapolis, MN

Operational Concerns

- When a fecal accident occurs, best practice is that the operator must clean tanks and basins before bathers are permitted to swim



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Thank You

KEVIN POST, MBA
COUNSILMAN-HUNSAKER
KEVINPOST@CHH2O.COM
WWW.CHH2O.COM



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