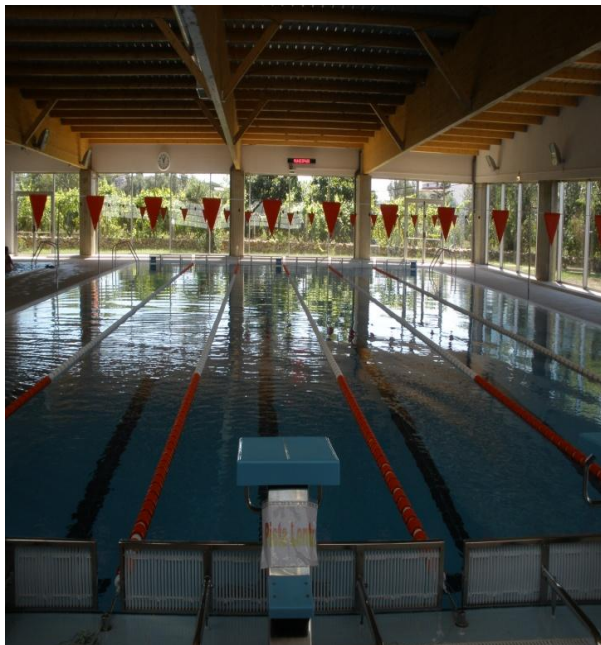




Danish Clean Water



Municipal Swimming Pool



The Installation: a Municipal Swimming pool of ca. 700 m³ for competition and a 100 m³ pool for children and senior citizens fitness. The disinfection comprised of sodium hypochlorite dosing and a complementary UV system with medium intensity lamp. The pH correction (using acid) and the hypochlorite were controlled with pH sensors and chlorine (photometric) sensors controlling the dosing pumps. There was also an ORP sensor as a backup in case of chlorine sensor malfunction. An additional algaecide was used to prevent the buildup of biofilms.



Acid, hypochlorite and flocculent



The UV lamp

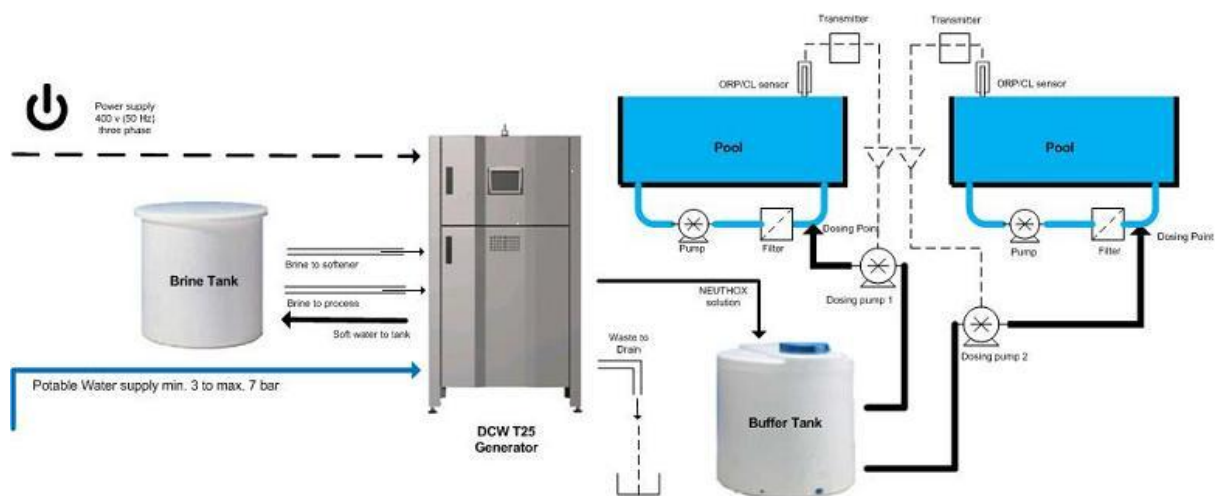
The Problem: despite the swimming pool being controlled by a new fully automated system, some water analyses detected levels above the legal limit for *Pseudomonas aeruginosa* and *Staphylococcus*. The small pool used by children, with perhaps less hygienic concerns, and at higher temperature (31°C), the levels of bacteria were a major cause of concern. The swimming pools were closed for some days to shock dose with hypochlorite and this practice continued each day before the collecting of the sample for analysis. The levels of residual chlorine were on average around 1,6 ppm. The presence of biofilms, which hypochlorite is relatively ineffective against, and the high load of human body substances, was the cause of the problem.

The Solution: A DCW generator of 250 liters/hour was installed and the hypochlorite disinfection was replaced by Neuthox. The generator was producing Neuthox to a 1200 liter buffer tank, and the dosing pumps were connected to the existing sensor controlled system.



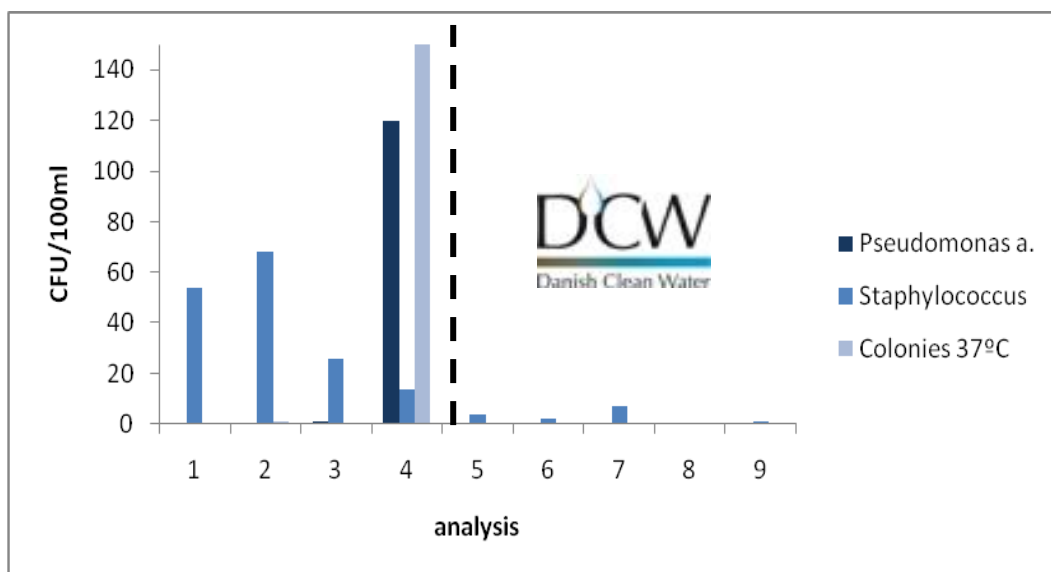
Below can be seen a schematic of the systems layout.

Pool application layout – Sensor controlled dosing



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The Results: only a couple days after using Neuthox, the swimming pool users (swimmers and workers) noticed a change in the swimming pool environment. The coordinator of the swimming pool, Dr^a Dulce Bernardo stated that she doesn't have to leave the swimming pool anymore, as she uses contact lenses and her eyes are not irritating anymore. Also the swimming pool lifeguards and users also state that there is no smell or taste of chlorine in the water swimming pool. It can be seen in the graph that after the installation of DCW generator there is no more *pseudomonas* counts or colonies at 37°C. Also, the level of staphylococcus is almost zero (limit is 20). These results were achieved with a low concentration of free chlorine, around 0,7 ppm.



In the picture down (left to right), our Portuguese dealer, the swimming



pool fitness instructor, the swimming pool coordinator and the Mayor of the city, Engº Antonio Eusébio, all very satisfied with the results of Danish Clean Water technology.

The Benefits:

- **Health**
 - workers and users are not subject to a strong, unpleasant environment, this will have direct impact in their future health
- **Safety**
 - no need to handle, mix or dilute hazardous chemicals
 - environmental friendly solution
- **Efficiency**
 - elimination of biofilms and inactivation of pathogenic microorganisms including Legionella and Pseudomonas species
 - more effective than chlorine and other pool disinfectants against Cryptosporidium and Giardia cysts, feces-associated microbes and viruses
 - better oxidizer than traditional chlorine which enhances filtration
- **Cost reducing**
 - the system is fully automatic and only requires a minimal operator attention
 - no need for transport, handling or storage of chlorine gas or hypochlorite
 - no need for additional chemicals or algaecides

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