



Water always flows differently?

Purifying water with UV light. It sounds so simple. But putting a new and dependable product on the market is by no means simple. Van Remmen UV Techniek is currently working on a system that should guarantee one hundred percent reliability. Since all water requires the same exposure to UV light, Van Remmen is investigating why water flows rapidly or slowly and when a sufficient amount of UV light has been distributed.

Ton van Remmen, Managing Director of Van Remmen UV Techniek, talks about their research into a UV reactor that can disinfect water. "We wanted to develop a reactor with UV light in the form of a shower head, that is the configuration we have patented. In the first instance we thought that every water drop would receive enough light. But water that is turbid or at some distance from the lamp was not properly treated. Therefore we had to study the behaviour of flowing water in combination with the spread of light."

Dose

The degree of disinfection is determined by the UV dose received by the water. This dose depends on the light intensity and the retention time of the water in that light.

Therefore, in the pipe through which the water flows, not every drop received the same dose of UV. "We had calculated it. But sometimes it worked and sometimes it did not", Van Remmen recounts. "To be able to produce a product that is reliable, we had to investigate why it works one time and does not work the next".

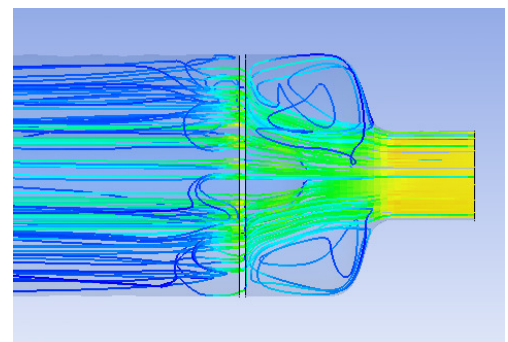
Environmental gain

SenterNovem, an agency of the Dutch Ministry of Economic Affairs, subsidised a study to investigate whether the flow of water could be manipulated. Owing to the possible environmental gain they could provide a grant in the framework of pre-competitive feasibility studies. In addition to the energy savings this project should yield, the project will also provide major savings in (rinsing) water, hydrogen peroxide and chlorine. Van Remmen UV Techniek expects that if there are 500 of these systems in operation, water consumption will be reduced by 2,847,000 cubic meters. Furthermore, the company expects to save approx. 591,300 kilogram of hydrogen peroxide and chlorine. Another important advantage is the improved microbiological reliability.

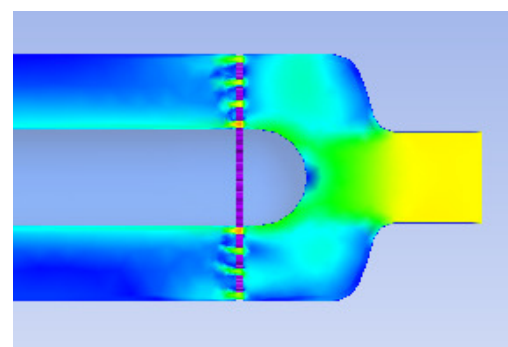
Prop flow

"Purifying with UV light is not chemistry", says Van Remmen. "When you are dealing with bacteria, the results can be highly unpredictable. In the first instance we assumed we were working with the so-called prop flow. That is a flow in which the water flows with the same velocity everywhere in the pipe. But this proved not to be the case. And we believed it wouldn't be possible to create such a prop flow either. Therefore we started experimenting with obstacles to manipulate the flow. We roughened the walls, worked with coatings and reflection, and installed little washboards. That is how our search for the right type of manipulation began", says Ton van Remmen.

The project required a lot of technical research. Van Remmen: "We started looking for small plates that we could install in the pipe to ensure that in some places the water would be exposed to the UV light for a longer time." The search for the right type of plates proved to be quite a challenge. "We also had to find the right material. But also the right dimensions and shape. Eventually we also had to drill holes in the plates. The size of these holes also proved to be of major importance for the end result." After countless experiments the company found the right plates that manipulated the water so as to produce a uniform flow.



Streamlines

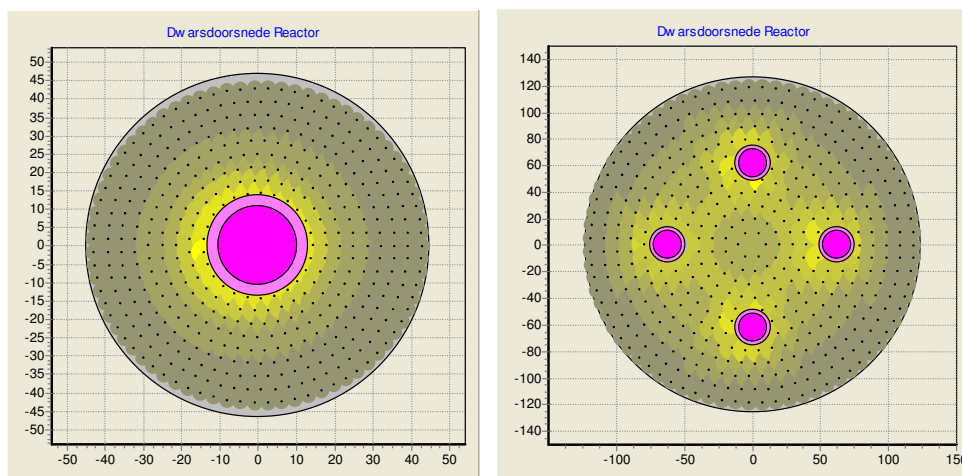


Velocity



Outside expertise

As a rule, a small organisation does not have all the disciplines in-house to handle all aspects of a research project. Van Remmen was no exception. "During the research we asked several parties to help us. To find the right people, we made use of our network. For instance, we asked someone with substantial expertise in hydraulics, i.e. the way water flows in a river, to look into the problem. Sometimes you see more from a different angle. Outside expertise also has the advantage that you can see if your own mind stays fresh", says Van Remmen.



Distribution of the intensity 1 lamps unit and 4 lamps unit

Field testing is indispensable in a project like this. Therefore Van Remmen is currently studying the options for swimming pool water. "We have installed two pilot units at swimming pools. If we succeed in purifying the water of these pools with UV technology, they will need less chlorine and less fresh water. The first results are good. We have good hopes for the effectiveness of UV light in swimming pools.", says Van Remmen.



Test container

Standards

For Van Remmen, the European standards for working with water and UV light are of major importance. "Standards for UV equipment are gradually being produced now. That is necessary too. For when you buy a television set you want to be able to watch at least BBC1 and BBC2. As soon as you connect it, you know if that is the case. With UV light you don't have this check. You buy something, but you don't know if it works properly. Therefore, standards or a certificate are indispensable. But of course such standards should be based on a good measuring system. The current systems are based on retention time and intensity, i.e. the amount of light every particle has received. For us that doesn't work. With proper microbiological backing you would draw a much more reliable picture, we think", Van Remmen says.

Refinement

Van Remmen UV Techniek is specialised in developing and producing UV disinfection equipment. As the company has a reputation to keep up, Van Remmen only wants to sell products that have properly been thought out and have proved their quality. Now we have made a major step. "We don't put a product on the market unless it is fully developed", says Van Remmen. "You shouldn't move too quickly. If it is not entirely reliable, you had better wait a

while longer. We are now only working on a few refinements. But these have to be perfect too. As from March 2009 we think we can start selling the reactors."

Environment & Technology Program

This project has been carried out with a grant from the Environment & Technology Programme of SenterNovem, which stimulates the development and application of innovative processes, products and services with environmental benefits. For more information see www.senternovem.nl/milieutechnologie or call the SenterNovem information desk +31 30 23 93 533.