



EXPECT
STORIES FROM
THE AVK WORLD

Expect... **AVK**



DEAR READER

Since the launch of our new website, we have been publishing articles and case stories online as they were sent to us. However, some markets have been missing the InterLink magazine and thus, we have collected a series of stories from the website and created this printable pdf-version which we hope you will enjoy reading.

Water has always been a topic of great interest and we know how important water is to human life. But what about the earth in general? Lately, I have come to realise that water should be discussed in a much wider perspective than previously and it belongs on the global agenda for energy, climate as well as health.

Water and energy are closely linked as they are mutually dependant on each other. The bad news is that water used in a conventional power plant can't be used for drinking water afterwards due to contamination. The International Energy Agency estimates that the energy consumption by 2035 will have increased by 50%, leading to an increase in water demand by 85% and thus, an even higher stress on the limited resources of water suitable as drinking water. The good news is, though, that it is possible to make the entire water circle through society energy neutral with today's technology – prevented

that the leakage rate is lower than 10% and all wastewater is collected, cleaned and turned into energy. If this is implemented, a municipality can save up to 40% on the energy bill. And at the end of the day, the best energy is the one not used. By turning wastewater into energy, the equivalent of fossil fuelled energy can be reduced leading to a lowering of the carbon footprint.

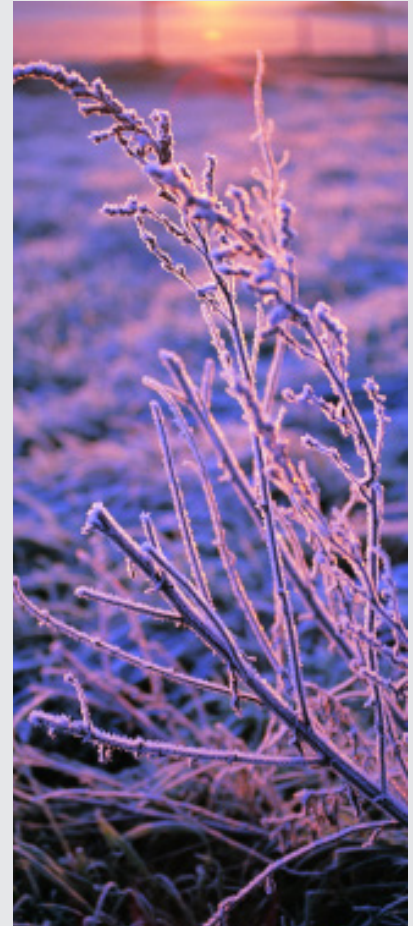
Climate changes have an impact on the water situation and on the water distribution network. In some places, we have too much water due to heavy rain; in other places we have too little due to drought and there are already parts of the world where we can see how life would change, if there was no water. Finally, in some places they have only dirty water and every year, more than one million people die of waterborne deceases. In addition, 2.3 billion people live without decent sanitation and 80% of all wastewater created by human activities are led directly into the nature without any treatment.

It is imperative that we protect water, and AVK offers reliable products that can be part of a sustainable water supply and wastewater treatment. Our long-lasting, high quality products are the backbone of any reliable water distribution network and well-functioning wastewater

treatment plant, and we care about our products in relation to health and safety.

Enjoy your reading about projects and events from all over the world.

Michael Ramlau-Hansen



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Frontpage picture

Installation of 12 AVK gate valves and dismantling joints pressure class PN16 to branch off the main water pipe in Aalst, Belgium.

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FURNES JERNSTØPERI, A NORWEGIAN PRODUCER OF MANHOLE COVERS

We are pleased to announce the completion of the acquisition by AVK of 100% of the shareholding in the Norwegian company Furnes Jernstøberi A/S.

*By Lars Kudsk,
CFO,
AVK Group*

Furnes Jernstøberi A/S (Furnes) has its main location in Stange, Norway and a yearly consolidated turnover of

NOK 300 mio. (30,6 mio. €). Furnes also consists of the Danish company Randers Jernstøberi A/S located in Randers, Denmark.

Furnes was founded in 1958 in Brumunddal, Norway and has during the years expanded to become a leading foundry for ductile-, and grey cast iron manhole covers, sold primarily in Scandinavia. The product range manufactured by Furnes will complement the AVK range of products, and the modern casting technology of Furnes will further add foundry competences to the AVK

Group and generate synergies with the existing foundries in China and Australia. Furnes will continue to operate as a separate company under the present management.

We welcome Furnes to the AVK Group.



AVK ACQUIRES 60% OF AC.MO S.R.L.

We are pleased to announce that we have completed the acquisition of a 60% stake in AC.MO s.r.l..

*By Lars Kudsk,
CFO,
AVK Group*

ACMO has its main location in Roncade, Italy just outside of Venice and further locations in Milan, Empoli (Tuscany) and Rome. The company was founded in 1968, has 48

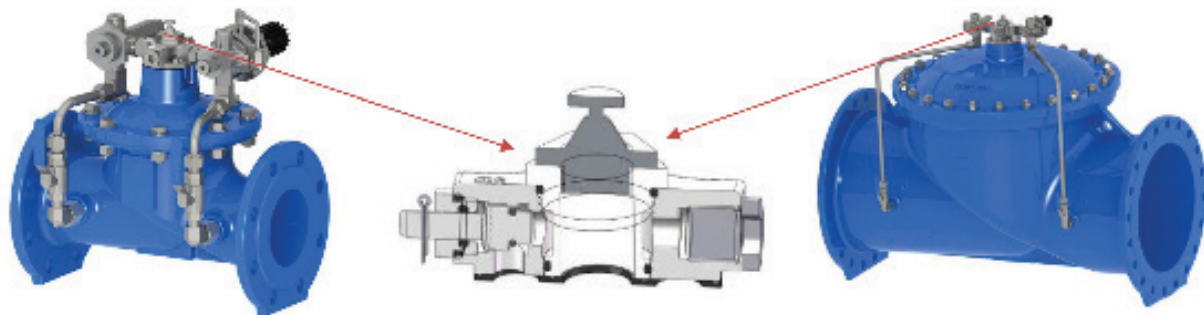
employees and expects a turnover this year of approx. €15 million. ACMO has a strong position in the irrigation market in Italy with a Smart hydrant, HydroPass, integrating control of the water flow, metering, prepayment system and communication for remote control. ACMO has developed other Smart solutions including e.g. on site local communication units, SCADA and cloud based solutions via the subsidiary company, AC.MO Technologie Integrate S.r.l. (ATI). ACMO will serve as the competence center for the AVK Group in Smart water solutions, thus adding digital solutions and intelligence to a long row of AVK

products that are vital for a sustainable water distribution network.

On top of this, the product range of ACMO includes a full range of needle valves, control valves, check valves and air valves, which especially for the needle valve will extend the product offering of the AVK Group along with further competence in pressure management.

With this new acquisition, ACMO will strengthen the entire AVK Group of Companies counting +100 companies and more than 3.800 dedicated employees.

RELEASE OF SERIES 859 AUTOMATIC CONTROL VALVE DN50-600 SS304 VERSION



By Søren Kjær,
Business Development Director,
Tech Development,
AVK Holding A/S

We are pleased to announce the release of Series 859 Automatic control valve DN50-600 SS304 version. In order to meet the market requirements, we developed a new option of S859 which has SS304 external & internal non-coated metal parts.

Meanwhile, we optimized the design of distribution block to ensure it can isolate control chamber in case of servicing the pilot circuit.

Main features are as follows:

Main control valve

- Lifted seat to avoid damage due to cavitation
- The parabolic plug, ensures an accurate regulation at low flow, and is reducing noise and vibration.
- Non-symmetric axial position of rubber diaphragm results in less stretch/stress near closed position
- All non-coated internals made of stainless steel AISI 304 or bronze
- Body and bonnet of ductile iron with fusion bonded epoxy, 300micron, GSK approved, RAL 5017, according to DIN 3476 and WRAS-DVGW/W270/UBA.

All rubber components with multiple approvals (EN 681-1, KTW, W270, ACS, WRAS)

Pilot system

- Modular and compact design for easy application change
- Main components made of stainless steel AISI 304:

Distribution block:

- Connecting main control valve to pilot system
- Integral Valve, used for isolating the control chamber, fixing position of main valve, in case of servicing the pilot circuit. The Integral Valve, can also be used, adjusting main valve reaction time
- Control orifice

Filter:

- High capacity, easy to flush
- Mesh 100, high performance wire screen type

Hydraulic control block:

- Includes balanced pilot, providing a stable pressure setpoint
- Can be set up for different applications using single-function or multi-function modules

HYDRANT MONITORING AT SKANDERBORG FORSYNINGSVIRKSOMHED A/S

DENMARK

AVK has brought old hydrants back to life by supplying new retrofitable hydrant covers with integrated sensor and communication system.

*By Karsten S. Nielsen,
Business Development Manager,
AVK Holding A/S*



Hydrants brought to life

AVK was contacted by Skanderborg Forsyningsvirksomhed A/S because they were facing an ongoing issue concerning the usage of their hydrants. They requested an application which could reveal when the hydrant cover is opened. The reason is that Skanderborg Forsyningsvirksomhed A/S for some time have suspected that some of their hydrants have been exposed to water theft and used to flush tanks of vacuum tankers.

Background

To limit the risk of contaminating the clean water supply, Skanderborg Forsyningsvirksomhed A/S first have to ensure that all vacuum tankers empty the tank in the correct location. Secondly, that they flush the tank

only by using a designated hydrant at the premises of Skanderborg Forsyningsvirksomhed A/S. However, they have for some time suspected that the flushing also takes place in other locations than the designated one; they just haven't had a system to neither confirm, nor deny their suspicion.

Skanderborg Forsyningsvirksomhed A/S have a license plate recognition system, which scans all license plates of vehicles going in and out of their premises. Combining the information of when the hydrant cover was opened and closed, with who was on site at that time can reveal which truck driver is using the designated hydrant correctly, and who isn't.

Besides the risk of contamination, draining water through a hydrant for other purposes than firefighting is theft and is leading to an increased amount of non-revenue water.

Specification

When Skanderborg Forsyningsvirksomhed A/S contacted AVK they asked for an application which was retrofitable, battery powered, communicating by using Sigfox protocol (radio communication), showing the position of the hydrant cover, and being nonvisible when the hydrant cover is closed.

These wishes were written into a project specification, and thus, the development phase could begin. The development of the application was

handled by ACOMO, the latest AVK acquisition, whom among other things excels in development of applications like this.

Solution

Besides the specifications mentioned, a big challenge was to find a solution which could be mounted on the inside of the hydrant cover while staying within the mechanical boundaries.

The solution is a fully encapsulated product which is mounted directly on the inside of the hydrant cover and holds an integrated battery (with 10 years lifetime), antenna, accelerometer and electrical board.

The accelerometer is sensing the gravitational force at any time. This means that when the hydrant cover is opened, the accelerometer is sensing a change in the relative gravitational force, which is leading to an alarm message.

The communication from the hydrant is sent via a Sigfox-concentrator to Skanderborg Forsyningsvirksomhed's SCADA-system. This enables them to monitor the position of the hydrant cover, battery condition and see historical data of the hydrant position.

In the near future, Skanderborg Forsyningsvirksomhed A/S believe

that they are able to reveal if in fact someone is misusing the hydrants as they are suspecting.

Furthermore, they are now able to monitor which truck drivers are actually using the designated hydrant, and thus following the instructions and who aren't.

At the end of the day, the monitoring is to ensure a continuous supply of clean and healthy water to the consumers, ensuring the lowest possible risk of contamination of water and trying to avoid theft which leads to an increased amount of non-revenue water.



Skanderborg Forsyningsvirksomhed A/S

Skanderborg Forsyningsvirksomhed A/S are the main supplier of water in the municipality of Skanderborg. They are furthermore responsible for all wastewater treatment in the municipality.

The AVK premises in Galten, Skovby and Låsby are located in the municipality of Skanderborg.

There are approx. 62.000 people living in Skanderborg Municipality.

RENOVATION RING ROAD AALST

BELGIUM

Farys installs 12 AVK gate valves and dismantling joints pressure class PN16 to branch off the main water pipe in Aalst, Belgium. These works are part of the renovation of the entire ring road around this Belgian city with approx. 85.000 inhabitants.

*By Ellen Jansegers,
Marketing,
AVK Belgium NV*



Project info

- Society: Farys
- Location: ring road Aalst (R41)
- Date: December 2016 - January 2017
- Products: 12 AVK gate valves + dismantling joints
- Pressure class: PN16
- Diameter: DN400

AVK Belgium delivers 12 gate valves and dismantling joints of DN400 and pressure class PN16 to branch of the main water pipe of the Siesegemlaan in Aalst.

The main water pipe, a DN900, is branched off at both sides by means of 6 AVK gate valves and dismantlings joints. The entire construction is built inside the roof of the tunnel underneath the Siesegemlaan.

The wedge of these gate valves is fully vulcanized with AVK's own



drinking water approved EPDM rubber compound. It features an outstanding durability due to the ability of the rubber to regain its original shape, the double bonding vulcanization process and the sturdy wedge design. The triple safety stem sealing system, the high strength stem and the thorough corrosion protection safeguard the unmatched reliability.

The renovation of the ring road around Aalst is necessary to ensure safer traffic. Moreover, the traffic circulation will be improved thanks to tunnels underneath the ring road and aligned traffic lights (so called 'green wave'). The ring road will have an increased capacity, thus improving the economic growth of the city.

The tunnels underneath the city will decrease traffic in the city centre and decrease noise pollution. Moreover, one of the tunnel roofs will be a 'green roof' with space for pedestrians and cyclists.

TEMA DELEGATION VISITS AVK ACADEMY

DENMARK

Two cities, with so much in common and so much to gain from cooperating, were the centre of attention when a delegation from Ghana visited Aarhus this June.

By Michael Ramlau-Hansen,
Global Brand Manager,
AVK Holding A/S



On 18-19 June, a strong delegation from Ghana Water Limited Company visited the Danish city of Aarhus to seek inspiration on how to create efficient and sustainable water management.

During the two days, the delegation visited a state-of-the-art sewage water treatment plant, a modern water treatment plant in Aarhus, and different local Danish companies producing world-class technology for the water sector — amongst these, AVK in Galten.

Towards more sustainable water management

Ghana is currently investing largely in improving their national water supply. Still, challenges remain such as a high non-revenue water level and poor operation and maintenance of the water infrastructure. Facing these challenges, the city of Tema and Ghana Water Limited Company have initiated a strategic sector cooperation (SSC) with the Municipality of Aarhus and Aarhus Vand A/S; the water utility of Aarhus. According to the mayor of Tema, Felix Mensah Nii Nang-La, the city has a serious problem with untreated wastewater contaminating their lakes and lagoons. Something that makes them look to Aarhus for inspiration:

“If you look at the rivers, lakes and lagoons in Aarhus, you don't see any water highly polluted, because there is an efficient wastewater treatment in place. This is one of the areas where we are looking for ideas and inspiration on this visit to Aarhus and in our future cooperation.”

*Felix Mensah Nii Anang-La
Mayor of Tema*

Aiming at a better and more efficient supply and treatment, the delegation emphasises the importance of focusing on the current performance and steps of improvement: “Of course, we shall not be able to replicate exactly what we see in Aarhus where operations are automated. But it is not about getting to what Aarhus Water is doing. It is about making our processes more efficient and improving our current performance.”, says Clifford Abdullah Braimah, Managing Director of Ghana Water.

As a starting point for the city of Tema, more efficient planning will help in cutting costs, ad hoc maintenance and huge water losses

The visit was a great way to show the companies' newest technologies and innovations, but also a great way for Denmark to really pioneer Danish solutions to water supply and treatment. As Global Brand Manager at AVK, Michael Ramlau-Hansen, puts it: “This visit was brilliant, because there was a lot of good questions. These were really people from the operation that know, what they are talking about. They are facing some challenges, we have some solutions, and that makes a perfect match.”

The collaboration is expected to lead to an agreement about a three-year project, which in the end should develop into a model when it comes to water supply and treatment – one that, hopefully, can be rolled out from Tema to the rest of Ghana.

The visit by the delegation from the city of Tema and Ghana Water Limited Company to their partners in Aarhus, Aarhus municipality and Aarhus Vand, forms part of the Strategic Sector Cooperation supported by Danida and facilitated by the Embassy of Denmark in Accra.

SEMINAR WITH DANFOSS AND AVK

DENMARK

The AVK Group has an opinion on energy and water efficiency which can inspire others in the industry.

*By Michael Ramlau-Hansen,
Global Brand Manager,
AVK Holding A/S*



Danfoss also wishes to make an impact on the environment. Therefore, AVK and Danfoss held two seminars with focus on water supply and wastewater treatment; one in Roskilde and one in Skovby, Denmark. With these seminars, we show that AVK and Danfoss are joining forces towards a better environment and that our products are compatible.

There is a great potential within water supply and wastewater treatment. Therefore, we chose to invite customers from both the water and wastewater industry. The participants started out hearing about the water challenges at a global level which was an eye opener for all participants. Moreover, Aarhus Vand told about their great work with optimizing their treatment plant and producing energy which was followed by breakout sessions where the participants were divided into small groups with room for more discussion and conversations.

Both days went as planned, and we aim to repeat the success with similar events.



Facts

- 80% of the world's wastewater is led, untreated, directly into the nature
- 1.8 billion people's drinking source is contaminated with faeces
- 140 litres of water is being used to produce 1 cup of coffee
- 15,000 litres of water is used to produce 1 kg of beef
- 30-50% of an average municipality's electricity consumption goes to water and wastewater management.
- If all of the world's water suppliers had the same low leakage loss as in Denmark, the world could save 130TWh which is the same as Poland's electricity consumption.
- It is possible to produce almost twice as much energy on a treatment plant than the plant itself consumes
- Handling water and wastewater consumes 4% of the world's total electricity which is equal to all of Russia's total amount of electricity consumption.

ROAD EXPANSION AFFECTING WATER PIPELINES

SWEDEN

The two-lane road Rotebroleden in Järfälla, Sweden has been expanded to a four-lane road – a project also affecting the water pipelines below ground.

*By David Sjöcrona,
Product Manager,
AVK Sverige AB*



Expanding from two to four lanes

The Swedish Transport Administration is expanding the road network around Stockholm and one of the roads has been expanded from two lanes to four lanes and a separate walk and bike lane. Obviously, this required a lot of construction work – not only above but also below ground. Related to the road expansion, Norrvatten, a municipal council producing drinking water and ensuring water for the consumers in the northeast part of the Swedish capital, needed to take action and move a water pipeline.

Re-dimensioning and replacing pipes

Norrvatten decided to renew remaining pipelines as well, even though these did not directly conflict with the road expansion. The pipelines were re-dimensioned from DN1000 to DN1200 and existing concrete and GAP pipes were replaced by steel pipes in order to meet future needs.

Three new sectioning valves with Y-fittings were incorporated on the route to facilitate future operations and create redundancy for the consumers.

3,000 metres with AVK solutions

The project covered a total of 3,000 metres of pipeline and a budget of approx. 13m euros. Along the pipeline AVK butterfly valves, gate valves and dismantling joints are installed.

As part of the project a new AVK air valve is tested. An underground air valve which is easy to maintain and allows for taking out water samples for testing. The air valve will be evaluated after a period of one year to see how it works during winter time.



AVK TRIPLES TURNOVER SOUTH AFRICA

A combination of drought and AVK's acquisition of a local company in Johannesburg has formed the beginning of a significant positive progress

*By Lars Kudsk,
CFO,
AVK Group*



South Africa offers great possibilities for industries to grow. However, it takes a great amount of patience and effort to navigate in the country's playing field when it comes to starting and running a successful business; something that AVK knows and still struggles with 15 years after entering the South African market.

After acquiring a local producer of larger valves back in 2014, the turnover has tripled and South Africa is now a substantial market for the AVK Group. One of the reasons being that the warm country simply needs good and lasting solutions to their drought issues.

The future for AVK in South Africa looks prosperous, even though local regulations complicate the process. Back in 2013, the South African government tightened the demands to foreign companies, which meant, as an example, that 70 % of value must be created locally. With the acquisition, and through a local training academy, the director in South Africa has eight-doubled the local staff now counting approximately 200.

Though high bureaucracy and short-notice cancellation of agreements has often delayed business processes, South

Africa has offered good, competent employees and a modern economy compared to other African countries.

Securing water supply and sustainable energy

Despite increasing the demands to foreign companies, the interest for attracting investments is still there; as an example, the South African president hopes to attract three billion dollars for improvement of water supply and more sustainable energy, and together with companies such as Kamstrup and Grundfos, AVK has many upcoming tasks.

Traditionally, South Africa has high expectations to their water supply efficiency and to the quality of their drinking water. This means good possibilities for AVK's quality products and solutions. The large valves are especially used for large water pipes between reservoirs and water works desalinating sea water for the cities' water supply, meaning that AVK now covers a larger market than before.

"South Africa is part of our long-term strategy. Therefore, we stay in the market and follow the demands of local authorities despite of high costs and a negative impact on our revenue."

SUCCESSFUL APPEARANCE IE EXPO CHINA 2019

CHINA

As the flagship for environmental protection in Asia, the 20th IE expo China was held at Shanghai New International Expo Center on 15-17 April 2019. The three-day exhibition attracted 73,097 professional visitors (+10%) from 58 countries in approximately 150,000 square metres.

By Ken Yan,
BD & Marketing Director,
AVK Valves (Shanghai) Co. Ltd.



AVK China presented a creative booth on a total surface of 88 square metres. Over 30 valves and fittings were presented on the stand focusing on the advanced product technology and innovative solutions of the whole industrial chain. During the exhibition, we received many visitors from various segments such as water supply, wastewater treatment, air and chemical processing, which will bring us more opportunities.

Smart Pressure Management made the attractive debut in IE expo China

“Smart Water” is an important part of the smart city in the higher stage of urban informatization after the digital city. In the process of building a smart city, the construction of “Smart Water”, which is called the urban lifeline, is an important component of smart city. AVK had an impressive demonstration on smart water solution of pressure management.

AVK control valve series 859 mounted with the ACMO PMD communication

device can provide a wide range of control applications in a Smart pressure management system. At the moment, a Smart valve solution was interpreted from different perspectives of hydraulic modelling, system and hardware. That can be finally achieved by integrating cloud technology into urban water network and change the traditional water company’s operation management model with Internet of Things.

AVK as world leading valve manufacturers, interviewed by E20 Environment Platform

Within its industry, AVK is the global leader with a strong presence around the world. During the exhibition, E20 the most influential environment platform in China, was deeply attracted and interviewed Mr. Hai Zhao, Managing Director of AVK Shanghai.

As Hai said, “AVK meets an ever changing world with global leadership and local commitment, keeps pushing the boundaries of what the market can expect, and provides the customers

with affordable high quality at the right place at the right time”

In addition, Hai Zhao also encouraged AVK Shanghai team: “Let’s jointly seize opportunities, meet challenges, and strive to make new progress in common development.”



AVK PRODUCTS INSTALLED IN THE LARGEST WASTEWATER TREATMENT PLANT IN THE CARIBBEAN

The Spanish company INCATEMA COSULTING AND ENGINEERING is an expert in water treatment and won the tender to build “Mirador Norte” wastewater treatment plant to treat Santo Domingo (Dominican Republic) wastewater before pouring water into Isabela and Ozama rivers.



By Javier García-Noblejas
General Manager.
AVK Válvulas S.A.

The “Mirador Norte” plant capacity is 104.000 m³/day which covers water treatment for a population over 500,000 people turning it in the largest wastewater treatment plant in the Caribbean. According to the budget, final investment for the project will be US\$ 50m.

The plant, in the north of Santo Domingo, is located at the nice “Mirador Norte Park” on the left bank of the Isabela River about 5 km upstream from the confluence with the Ozama River. Both rivers will be completely cleaned and recovered before released into the Caribbean Sea precisely in the centre of Santo Domingo next to the “Zona Colonial” (old colonial neighbourhood).

AVK valves installed:

- Gate valves, AVK series 06/30 2”-12”
- Concentric butterfly valves, AVK series 820
- Check valves, AVK series 41
- Ball check valves, AVK series 53
- Knife gate valves, AVK series 702
- Dismantling joints, AVK series 59



TOWARDS A CLEARER WATER FUTURE

DENMARK

Amidst global environmental challenges, Danish companies and organisations are pioneering some of the most exciting and forward-thinking water solutions in the world today

*By William Steel
Freelance reporter*



Oftentimes, the product of interdisciplinary collaboration, these novel technologies and approaches — many of which extend proof of concept and are already in operation in the small Scandinavian nation — stand out as emblems of an industry in transition.

As we become increasingly aware of the critical significance of sustainable water and wastewater management, we can be encouraged by the emergence of these working solutions which show that there is another way to approach provision of these most essential of services. A way that is defined by sustainability and holistic thinking gearing water and wastewater services for complementary integration with other sectors of human industry and activity we seek to better.

To be sure, we are seeing how water sectors can give back to society across multiple metrics, besides providing the vital services we typically associated with them.

So for good reason, Danish water technologies and know-how is an increasingly common feature of water operations the world over. In Denmark itself, however, it is clear that the

groups responsible for forging this new direction for water and wastewater are far from done. There are higher targets, ambitious prototypes, and new solutions in the pipeline — all pitched for bringing water sectors further into the twenty-first century.

A three-part series takes a look at three areas of focus in the Danish water landscape, exploring some of the flagship solutions now in operation and planned for the future, as well as the philosophy and collaboration that has helped secure successes to date and underpins a shift to a clearer water future.

The series is published as a complement and introduction to the Aarhus University Centre for Water Technology (WATEC) summer school, 'Advanced Water Cycle Management Course', which was hosted 11-23 August 2019 in Denmark. On page 16-23 you can read the three-part series.

For readers interested in learning more about the contents of this article, and the Danish water sector at large, the Aarhus University Centre for Water

Technology (WATEC) summer school may be for you.

In 2020, WATEC will host a two-week summer school delivering the knowledge, skills and perspective required for grappling with some of the most critical water challenges of our time.

The event represents a unique collaboration between WATEC, pioneering water utilities and world leading companies within the Danish water sector.

PART 1. SOURCE - PRIORITIZING GROUND WATER RESOURCE MANAGEMENT

DENMARK

It is no exaggeration to note that Denmark's water and wastewater sectors stand out on the international water scene. There are many and more reasons for this — much of which this three-part series aims to explore. To begin aptly enough, a significant distinguishing feature of Danish water concerns how it is sourced.



By William Steel
Freelance reporter

Unlike many countries, virtually all Danish drinking water is drawn from groundwater. Although groundwater abstraction brings its own challenges, what Denmark demonstrates is that if done correctly, sustainably managed groundwater fosters benefits that carry forward throughout the water cycle and beyond.

Rune Kier, strategist at one of Denmark's leading water utilities, Skanderborg Utility and AquaGlobe — Water Solution Center, observes: 'Because of their importance, we have a widespread political and societal agreement that groundwater resources must be protected from pollution and other harmful impacts of human activities — that water should be protected, not treated.'

It follows that a key prerequisite for protection is thorough insight on groundwater resources which can inform effective action plans

and legislation that prohibit the use of pesticides, and other industrial activities, in drilling areas.

Kier explains that this protect-not-treat ethos has therefore prompted a number of initiatives to secure its intentions, and as he says, "has led to all sorts of sustainable practices and knock-on benefits for the rest of the water supply sector, and the environment." A fundamental initiative has been groundwater mapping.

Groundwater mapping

So as to develop a sound understanding of aquifers from which to work, some twenty years ago Denmark committed to mapping its groundwater resources. The work was guided by ambitions of securing aquifers from pollution, as well as facilitating sustainable management of water resources.

The integrative effort involved identifying all national aquifers, gathering volumetric data on them, and developing tools for structuring, modelling, and visualizing data into usable formats.

An industry player supporting groundwater management initiatives has been the Danish engineering consultancy company, NIRAS. Mette Neerup Jeppesen, manager for water supply at NIRAS, describes several projects involving collecting and modelling groundwater data, in which the company partnered with water suppliers: "We developed and deployed a lot of high-tech systems for the mapping, but it's been well worth the effort. It's clear that careful management and protection of aquifers provides a route to avoiding a lot of expense and effort on treating drinking water."

As an example of this, Kier explained: “With assurance on aquifers, we can use only the simplest of filtering techniques for treating groundwater, in fact just two types of filter. It’s simple and low-tech, without the need for disinfectants like chlorine or complex processes, and saves on operational and infrastructure expenditure.”

Broad aquifer data has also been used to build groundwater resource management tools. In the city of Odense for instance, aquifer data is utilized by an intelligent control system for water abstraction. The system is fully integrated with existing supervisory control and data acquisition (SCADA) systems, and helps ensure abstraction is optimized across time and seasons, and with usage.

Aquifer mapping has also facilitated efforts which carry the dual benefit of protecting resources, whilst contributing to the environment. A prime example is afforestation to protect groundwater and well-field catchment areas, which aid in reducing the national CO2 footprint by absorbing CO2 from the atmosphere.

Developing the right tools

Specialists in geographic information systems and geoscience, Danish software outfit I•GIS, played a key role developing novel tools to support groundwater mapping. Together with input from other stakeholders, the work has culminated in what’s come to be known as the so-called Danish Model for mapping and protecting groundwater.

Tom Martlev Pallesen, head of production & consultancy at I•GIS, expanded on the development of new 3D software for inspecting and visualizing geologic models.

“In the beginning of the mapping campaign, new mapping methods were developed and refined, especially geophysical methods. The data from those created a new demand for geological mapping software able to handle these new datatypes and the rapidly growing amount of data. In this context the modelling software GeoScene3D, as we see it today, was developed.”

A key strength of GeoScene 3D is its overcoming traditional problems associated with modelling with different approaches and different softwares, which led to creating a large, inhomogeneous datasets. Instead, when a geological model is made in GeoScene3D it can be exported in different file formats, including the Danish Model database format, which makes it possible to upload a geological model directly from GeoScene3D to the national model database, where other stakeholders (modelers, hydrologists, utilities, committees, etc.) can download and use the results.

GeoScene3D can also be connected to the Danish borehole database and the geophysical database GERDA for data import. It’s this kind of streamlining — enabling better insights and interoperability between stakeholders — that has empowered water utilities and other actors to take a proactive approach to sustainable groundwater management.

“The option of visually integrating many different data types into one software, especially geophysical data, is quite unique,” said Martlev Pallesen, adding that the GeoScene3D solution has become a central component in multiple international partnerships established to export the Danish model.

International value

With almost complete reliance on aquifers for supply of drinking water, it’s clear why Denmark has invested as it has with groundwater mapping and management solutions. Nevertheless, given the state of water scarcity in many regions of the world, there is a strong case to be made for aquifer mapping solutions being deployed around the world.

That all potential fresh water resources come to be known is of clear benefit to all nations — enabling greater access to water, better management of resources, and evidence based guidelines to help inform plans for environmental protection and industrial development that work to safeguard water resources for future generations.

Aarhus Vand’s Jacobsen remarks: “We’ve developed a lot of tools that have proven very useful here in Denmark, but which would be neatly applied in other countries to similar success. These are very marketable solutions for export.” Rune Kier agreed, suggesting that, “mapping on a national scale may be challenging in larger countries, but the solution itself is technically feasible and would be most valuable.”

It is for these reasons that the WATEC summer school will host a track dedicated to groundwater resource management.

Commenting on this, Kier concludes: “With groundwater management in Denmark, there is a lot of cooperation across agencies, utilities, communities, private companies — it’s central to the Danish approach. Seeing how this operates would be very interesting to outside groups. Adopting these kind of practices requires broadening one’s perspective, and longer term thinking, but that requires insights and seeing the value of cooperation first-hand.”

Pia Jacobsen, chief engineer – water reuse, at one of Denmark’s largest water utilities, Aarhus Vand, explains:

“A great number of state and private companies have been involved in the mapping work, all bringing specific expertise to the development of the solutions we now have at our disposal.”

PART 2. SUPPLY - ADVANCING MANAGEMENT OF WATER DISTRIBUTION

DENMARK

A hallmark of water supply in Denmark is its being planned and managed with twofold appreciation for water as a valuable resource and the need to be mindful of energy consumption. Prioritizing across these levels has led Danish utilities to being at the forefront of developing smart water networks, fit for the twenty-first century.

*By William Steel
Freelance reporter*

In several notable municipalities the outcomes are plain to see. Non-revenue water (NRW) is remarkably low throughout Denmark, but across the utilities of 3VAND — representing water utilities of the cities Copenhagen, Odense and Aarhus together providing water to 2 million people — it is just 6%. Meanwhile, national security of supply is practically 100%.

Estimates put global NRW at 126 billion m³/year, costing some \$39 billion/year (Liemberger & Wyatt, 2018), and average global NRW above 30%. Given these numbers, it's of clear importance that awareness and access to viable solutions are supported. In Denmark, a variety of tools and efforts have been put in place to deliver such a low NRW level, and the nation has a formalized ambition to support the tunneling of its solutions and expertise to outside regions.

Klavs Høgh, project director for water supply at the Danish engineering consultancy company NIRAS, remarks



on his perspective on Denmark's transition. Denmark are having some of the lowest water loss rates in the world. Klavs Høgh says: "In many places around the world, water loss is unfortunately very high. But we have proven that solutions can be implemented to dramatically improve that situation."

Mette Neerup Jeppesen, manager for water supply at NIRAS, adds: "Having progressed through a long process to get NRW so low. We're now in a position to share knowledge with others so they don't have to go through the long learning process we went through. It has become a fundamental part of NIRAS business philosophy to support sustainable operations, and contribute to UN sustainable development goals (SDGs), wherever we can. We generally make great efforts to think more sustainably."

The reasoning, Neerup Jeppesen explains, is simple: "Both because we feel a responsibility to contribute to the

technological development moving that direction and because it is very often is associated with healthy finances for our customers."

Interestingly, the efforts have led to outcomes credited with greater value than first envisioned. As Neerup Jeppesen notes: "Ten years ago, we didn't know how significant lowering NRW would be, but it's especially clear now in light of energy and water targets, and the SDGs."

Supply as an integrated system

What emerges from reviewing the ingredients to Danish success with NRW is that there is no single solution. But rather a myriad of pieces to the puzzle, set in place with a holistic approach to planning infrastructure and managing operations. This latter dimension is described by Høgh as, "treating the whole distribution system as one integrated system."

Høgh expanded on this, saying: “You have to look at optimizing your pipe infrastructure with separately metered district metered areas (DMAs). While, at the same time adding all the necessary “handles” such as intelligent pumps and valves that react to the actual demand to improve pressure control and flow. Thereby, combining with sensors and smart devices within a comprehensive management strategy. All sorts of factors are at play in lowering NRW; certainly, a longer-sighted solution, built for the future, is much more cost-effective in the long-run.”

Danish DMAs therefore represent a multi-faceted solution, incorporating novel physical technologies alongside sophisticated monitoring and operating of the network via supervisory control and data acquisition (SCADA) systems.

Pia Jacobsen, chief engineer – water reuse, at one of Denmark’s largest water utilities, Aarhus Vand, explains this path to securing such low NRW, saying: “It’s a thirty year story, with a focus on water usage and leakage. The adoption of DMAs has been a major source of gains, helping us to bring NRW to around 5%.”

But Jacobsen comments that implementing DMAs wasn’t an overnight solution. Rather, they had to be refined over time: “We’ve learned much about optimizing the size of a DMA for monitoring the water balancing and leakage. But also integrating their management through common SCADA platforms, and the operation of multiple teams responsible for different tasks working across.”

In Skanderborg municipality, just adjacent to Aarhus, similar works have been undertaken to improve supply.

Here, the adoption of DMAs and smart technologies across the supply network has brought about flexibility and new options, and improved asset management. It’s also much more sustainable; enabling energy efficiency advances which are critical considering the significant amounts of energy required to produce and supply water.

“As early as 2015 we realized that consumption data can be used for

much more than smooth billing,” comments Rune Kier, water strategist in Skanderborg Utility and AquaGlobe – Water Solution Center.

“We did a pilot project called Smart Water City with Kamstrup, EnviDan and DHI aiming to use hour-by-hour consumption data to project future consumption and control pump operations. The pilot alone saved 15% energy the first year we introduced DMAs in a limited area, and a further 10% the next year on all our water works combined. And we reached as low as 6% water loss. With that number comes much faster detection of leakages, fewer man hours spent and better asset management.”

Moving forward, Kier explained that Skanderborg Utility and AquaGlobe are undertaking a new project adding the partners the Alexandra Institute and Aarhus Vand. “It’s called CHAIN – Smart Water Network, and it explores the potential of Artificial Intelligence and machine learning in the supply net from well to tap. We believe it can bring us as low as 3% water loss as well as benefits in energy efficiency, water quality and security of supply”.

Project LEAKman

Despite accomplishments with NRW, Danish water tech players are pushing forward with new technologies and systems, and seeking to secure still better results. Project LEAKman is a perfect example.

Developed by an association of nine Danish partners representing technology providers, consultants, water utilities and the Technical University of Denmark. Which includes AVK, NIRAS, Grundfos, Kamstrup (all partners to the WATEC summer school). LEAKman aims to deliver a comprehensive state-of-the-art solution that can reduce water loss and help solve the global challenge of NRW.

Additionally, LEAKman will establish guidelines for selecting the proper technologies, systems, tools and techniques to be implemented at water utilities around the world to optimise the effect on NRW reduction.

The project embraces an approach where all pieces are at play, including

economic analysis of the return of investment (and financial impact of NRW). But also selecting appropriate KPIs for monitoring the current state and set targets for monitoring effects of different leakage management solutions. As well as evaluation of implementation of system interfaces.

Høgh, project manager at LEAKman, explains: “The goal is to get the existing elements to work together, and to exchange data and knowledge to make us all smarter in the process. To do this we are using advanced hydraulic modelling to plan and design the optimal solutions and combination of systems before they are installed.”

“But it does not stop there, when the various elements are installed, we collect online data from all devices, and we have the hydraulic models running real-time to further strengthen the monitoring and allow for real-time optimization and control.”

One LEAKman partner is leading supplier of intelligent energy and water metering solutions, Denmark’s Kamstrup, whose role in the project is focused on making water consumption more transparent. Presently this involves almost 5,000 remotely-read smart meters now installed in LEAKman project demonstration areas.

Stig Knudsen, product manager at Kamstrup says: “To reduce water loss, you have to find leaks fast and to do that, you need to know what you’re looking for. That’s where we come in: mapping water loss through remote network reading and info codes.”

Alongside measuring consumption, Kamstrup’s meters enable ongoing online water balance monitoring across DMAs by providing utilities with metrics and notifications about leaks and bursts, temperature variations, tampering, and back flows.

Altogether the system will circumvent manual meter readings, estimated calculations and the problems relating to time-consuming follow-ups on inaccurate or missing readings.

Kamstrup also provides pressure sensors that allow the utilities to

perform pressure optimization based on knowledge of the actual pressure at the critical points of the distribution network. Such an approach avoids reliance on ‘theory and assumptions’, and provides utilities far more accurate, actionable intelligence to work from, for instance facilitating tracking and possibly avoiding pressure surges altogether.

Another key player in LEAKman, and in Danish water supply scene, is AVK Group; a Danish outfit and a world leader in production of valves, hydrants, and accessories for water distribution network.

AVK’s advancement of sophisticated valve technology is key, since it enables operating supply at the lowest required pressure. Thereby, reducing both leakage from existing leaks and also burst frequency. While, reducing energy consumption and prolonging the lifetime of the pipes.

In fall 2018, intelligent valves for pressure reduction from AVK were implemented in two LEAKman demonstration areas. These AVK valves continuously manage and minimize the pressure across DMAs whilst ensuring the minimum required pressure at all end-user connections. Earlier feasibility studies have shown pressure reduction potentials of 35% in Klampenborg DMA and 30% in Mileparken DMA thanks in part to the valves.

Grundfos, a global leader in advanced pump solutions and a trendsetter in water technology, has also supported the work in Denmark that has secured such remarkably low NRW.

Intelligent pumps that are controlled by the actual demand of the systems lowers the pressure from pumping areas to an absolute minimum, thereby reducing both leakages and energy. This is the concept of demand driven distribution, developed by Grundfos to bring maximum benefit to the water utility.

Water supply in the smart town of Nye

In other instances, entirely novel water supply solutions are under development. In the sustainable concept-town of Nye, outside of

Aarhus, rainwater is collected and purified at a centralized facility before distribution for clothes washing and toilet water. Starting with around 250 houses, the initiative will be ramped up to supply 20,000 people across some 6,000 residences.

Aarhus Vand’s Jacobsen comments: “It’s a definite option for new developments in other places, and we’re looking into other options for scaling up the water recycling too.”

The work warrants close attention, especially for new towns being built, where opportunities for sustainable infrastructure from day one are in play.

Water on demand

A powerful combination of smart technologies, coupled with soft solutions such as DMAs has proven highly effective in Danish water supply, but the story is not over.

As Aarhus Vand’s Jacobsen notes: “We’re still pushing innovation, and especially interested in potential gains available in energy efficiency that can be attained with automation and variable controls in supply. We’re aiming to build up a system where we can forecast usage, so we know what to deliver, when to deliver, and what to produce. Our hope is water on demand.”

“It’s work that requires working with companies, like AVK and Grundfos, on better valve control in pumping systems where we adapt to a certain pressure in the system.”

Jacobsen’s colleague, Jan Tøibner, adds that other new solutions and approaches are being explored too: “An example is automation, and robotics. Using data to optimize assets and provide prognostic assessment of pipes is incredibly exciting and looks towards providing means to avoid renewing too soon, or too late — something that’s key to lifetime operations costs of a system. Automation is one of the biggest opportunities we have when it comes to lowering the energy consumption.”

PART 3. SEQUESTER - REDEFINING WASTEWATER

DENMARK

One of the most encouraging aspects to the Danish water landscape is found in its having fostered some of the most compelling displays of sustainable wastewater management in the world. Indeed, already in operation at several wastewater treatment plants (WWTPs) around the country are solutions securing results that just a decade ago might have been dismissed as outlandish.

*By William Steel
Freelance reporter*



To be sure, of the hundreds of foreign water industry stakeholders who visit these facilities every year, most leave in clear awe of what they see and learn.

There is good reason for the favorable impression that people depart with. Not only having many facilities demonstrated routes to securing energy neutrality — a claim many more Danish plants are working towards — a number are significantly net positive. This happens from a combination of energy consumption reduction initiatives and onsite energy production capabilities.

Remarkably, Marselisborg WWTP in Aarhus produces up to 70% more energy than it uses. Energy is sent to consumers in the form of green electricity and heat; making Marselisborg the world's most energy efficient treatment plant.

Here, the generation of power from anaerobic digestion of sludge is complemented with production of heat which is supplied to district heating networks. It is, to be clear, a remarkable state of affairs given that within just a lifetime, wastewater treatment within many of those same municipalities represented the largest

single source of energy consumption in their region.

And yet the story does not end there. While nascent in its development, considerable gains have been made in the field of resource recovery from wastewater streams.

Presently, various systems are in place at facilities trialing and refining techniques for sequestering nutrients whilst also producing other soil enriching byproducts for the agricultural industry. Alongside Germany, which borders Denmark to the south, the country is without doubt at the forefront of resource recovery.

Jens Munk-Poulsen, manager of wastewater in Skanderborg Utility and AquaGlobe – Water Solution Center, provides outlook on the themes driving innovation across the Danish wastewater scene, saying: “The circular economy is making a huge entry into wastewater treatment, alongside environmental protection and energy production. Altogether, energy efficient smart water technology, coupled with energy production technology changes plants in a fundamental manner. It's such an obvious business case bringing down CO2 emissions, it hurts

to see it not being adopted the world over.”

From net-neutral to net-positive

Key to WWTP self-sufficiency has been reducing energy consumption in the first instance. Recalling that part two of this series explored improving energy efficiency across supply networks, great advances have also been made at treatment facilities to reduce process energy demands.

Aarhus Vand is water utility to Denmark's second largest city, providing water supply, storm- and wastewater services to Aarhus municipality and its 350,000 residents. The utility operates four large WWTPs that collectively receive approximately 35 million cubic meters of wastewater a year.

In recent years, Aarhus Vand has engaged in a radical overhaul of its assets geared towards delivering a more sustainable ecosystem of infrastructure and processes. Against a backdrop of seemingly contradicting objectives — including, expanding capacity, reducing effluent volumes and energy consumption, whilst also delivering on resource recovery targets

— it is remarkable to report on Aarhus Vand’s successes.

Pia Jacobsen, chief engineer – water reuse Aarhus Vand, explains: “Our resource strategy is very ambitious. For instance, a target is to reach energy production at Egå WWTP similar to what we’ve achieved at Marselisborg. When we talk about CO₂, by 2030 we aim to be 100% energy and CO₂ neutral across the whole water cycle. There are also goals for increasing phosphorous recovery — the goal is to ramp up to produce 200 tons per year across Åby and Marselisborg.”

A critical part of the solution to these net-positive ambitions was found in process optimization, involving real-time monitoring of processes, and systems that automatically fine-tune processes in response to variable conditions.

Process optimization at Aarhus Vand was very much a result of collaboration with Danish water solutions expert, DHI. Jacobsen comments: “Traditionally processes were built very safely, without concern for energy consumption. Now we’re working much more closely to the processes, and controlling them more finely. Our plants are also mostly fully automated, again largely achieved through collaboration with DHI.”

Jacobsen continues: “Enabled by new technologies which provide insight on what’s actually happening, we can, for instance, optimize aeration for specific processes and not just to keep to a certain oxygen level in the water. Another example is optimizing basin capacities, by equalizing across basins to avoid bottle-necks.”

Jacobsen highlights a DHI Solution Software called Data Integration and Management System (DIMS). Which functions on top of the existing supervisory control and data acquisition/programmable logic controller (SCADA/PLC) systems. Moreover, it utilizes new sensors (including ones monitoring ammonium-, nitrate-, and phosphate) to enable calculated set point control and automated optimization of processes, whilst avoiding major construction extensions.

These deployments in mind, Jacobsen cautions that we should not underestimated the importance of high-quality hardware: “The opportunities of advanced SCADA require particular physical solutions, for instance variable valves, gate controls and so on. For this it’s been critical to work with companies such as AVK to develop new solutions.”

Clear outcomes

With process optimization systems in place at Aarhus Vand’s four major plants, treatment capacities increased, while energy and chemical consumptions lowered. The plants lowered their CO₂ emissions and ultimately their collective environmental footprint. Effluent values decreased too and are now highly predictable according to given ammonium and phosphate set-points.

Torben With Ottosen, sales manager at DHI, says: “Success of the system demonstrates how it’s possible to achieve more with less. Indeed, economic outcomes were better than expected.” In total, implementation of wastewater treatment optimization by DHI and partners led to annual savings of around €701,000 (\$797,000) across the four WWTPs. This sum includes annual savings in effluent taxes amounting to €162,000 (\$184,000) and savings in energy and chemicals totaling €276,000 (\$314,653).

In terms of energy output through 2018, Marselisborg produced 4,552 MWh electricity and 4,676 MWh heat.

The ambitions are spreading, and Skanderborg’s utility is on a similar track. Neighbouring Aarhus Vand is Skanderborg Supply — a smaller outfit, but one also punching above its weight in terms of innovation. As Poulsen said: “We aim for climate neutrality, and are in a liminal stage with respect to that. The next year should be very exciting for us.”

Collaborative atmosphere

What is clear from the Danish perspective is the value of partnership and cooperation. Jacobsen remarks: “In Denmark, collaboration between public and private actors has been in play with some years. It’s been key to our success and I only see it as

increasing. We need to collaborate — no individual company can deliver the solutions the global industry requires.’

DHI’s Ottosen agrees, saying: “Our approach is very much to deal and plan for the unknowns and become more robust and resilient; and to find new synergies — that requires perspective from multiple stakeholders.”

He continues: “Collaboration isn’t only leading to novel solutions, it reduces costs. Delegations that visit Hillerød (a plant fully integrated within a public park) often remark that they simply don’t understand its cost of 265 million DKK (\$40 million). If that were built in the US they expect it would cost about \$265 million! It makes it clear for me, how important it is that we share these solutions and knowledge.”

Centralization of WWTPs

Against this background of novel technologies being implemented, a notable trend is centralization of plants.

Skanderborg Utility, for instance, is looking to moving from six facilities to two or three, maybe even just one WWTP in the future.

Poulsen comments on aspects of the rationale for this saying: “Many utilities are working towards energy neutrality, but towards energy production, many plants lack the critical mass for digesters to be effective or profitable. Centralizing WWTPs, to fewer but larger plants incorporating supply plus treatment, will improve the situation.”

In considering the options when replacing aging infrastructure, a concern of prospective customers is an expectation of high upfront capital costs. But there is a silver lining, as Poulsen explained: “Energy efficiency measures are easier to get going first and can deliver significant results; we saved 10% in operational expenditure through smart water technology and

5% on wastewater treatment between 2017 and 2018. In 2018, in another WWTP we saved 28% through energy efficiency, with 75% savings on aeration alone.”

Centralization is also underway in Aarhus, and a new, larger plant is in the planning. Jacobsen described the forthcoming Aarhus ReWater as a developing plant, “open to new technologies from day one with a modular construction, so that new technologies can be implemented.”

Aarhus ReWater is pitched to become one of the most advanced treatment and resource plants in the world when it comes online 2026.

A first-mover on resource recovery

A final notable aspect to the Danish wastewater scene, is its chartering new waters with embrace of a circular economy doctrine. The objective of which is to improve both the environment and the economy of activities by retaining and recovering all valuable resources in circulation.

At WWTPs, a clear circular economy business case is evident in the recovery of nutrients, including phosphates from incinerated sludge ash, and phosphates in the form of struvite from wastewater.

Further still, ash is being recovered and used in construction materials. Already beyond proof of concept, several Danish WWTPs are pioneering resource recovery systems, including Åby WWTP in Aarhus where struvite is turned into ‘PhosphorCare’ fertiliser.

DHI’s Ottosen remarks: “We initiated nutrient removal some years ago and have matured technologies over the last twenty-five years. Our experiences to date mean that in Denmark we have a lot to share about delivering nutrients from waste as commodities, and the path to redefining treatment plants as economically and environmentally productive enterprises.”

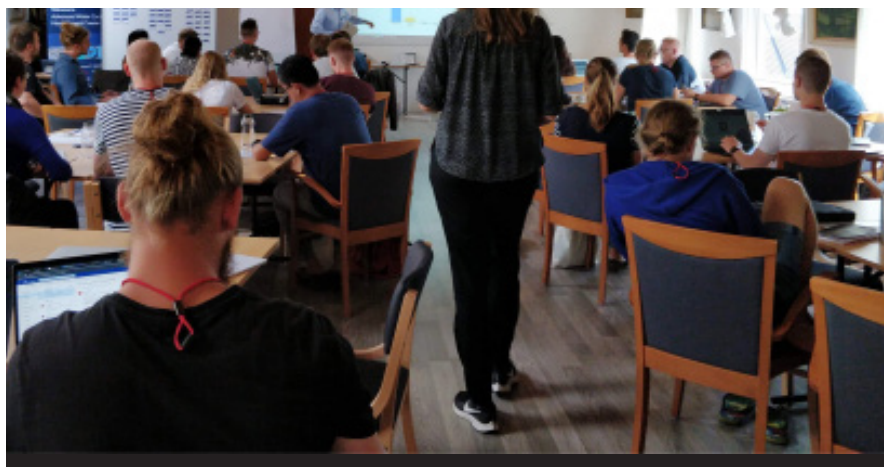


STUDENTS AND REPRESENTATIVES FROM ALL OVER THE WORLD SOLVE GLOBAL WATER CHALLENGES

DENMARK

Together with Aarhus University, AVK and leading Danish water companies are equipping the world's future water industry at new water summer school – the very first of its kind.

*By Michael Ramlau-Hansen,
Global Brand Manager,
AVK Holding A/S*



In this very second, almost one billion people are getting through the day without access to clean drinking water, and within the next two minutes at least one child will die from a waterborne disease due to inadequate water supply and sanitation. Problems that only increase as populations and demands rise. More than 80 percent of globally produced wastewater is discharged directly into the nature without any prior treatment, while the cleaning process alone could be used to produce renewable energy – something that more than 2.5 billion people have none or limited access to.

These grim scenarios are, however, far from the reality in Denmark where highly advanced water systems and energy-producing wastewater plants have made the country a global

frontrunner when it comes to water management. Pondering on these vast contrasts led to an idea at AVK; a summer school where students from all over the world are introduced to the technologies and thoughts behind Danish water management. A school that focuses on preparing the students for solving some of today's and tomorrow's massive resource challenges.

On 11 August, 46 enrollees arrived in Låsby ready to join the first-ever water summer school offering valuable insights to how global water resources can be efficiently managed. The enrollees were a mix of representatives from ministries, companies and public institutions and of students on bachelor, master and ph.D. levels. They arrived to Låsby from Spain, Finland,

Lithuania, Indonesia, the US, Slovakia, Malaysia, South Africa, Portugal, India, Italy, Norway and Germany.

The summer school, which runs by the name "Advanced Water Cycle Management Course", has been created together with Aarhus University, Aarhus University Centre for Water Technology, Grundfos, Kamstrup, DHI, Skanderborg Forsyningsvirksomhed A/S, NIRAS, Aarhus University School of Engineering, AquaGlobe, I-GIS and Aarhus Vand. All of these took part in the intensive, two-week tuition, contributing with their particular area of expertise.

A valuable lesson

There are several summer schools on i.e. wind, but none about water, in spite of a huge but also very important potential for improvement. And the issue is only increasing, fuelling the idea of knowledge sharing even more;

Leading technologies within water management

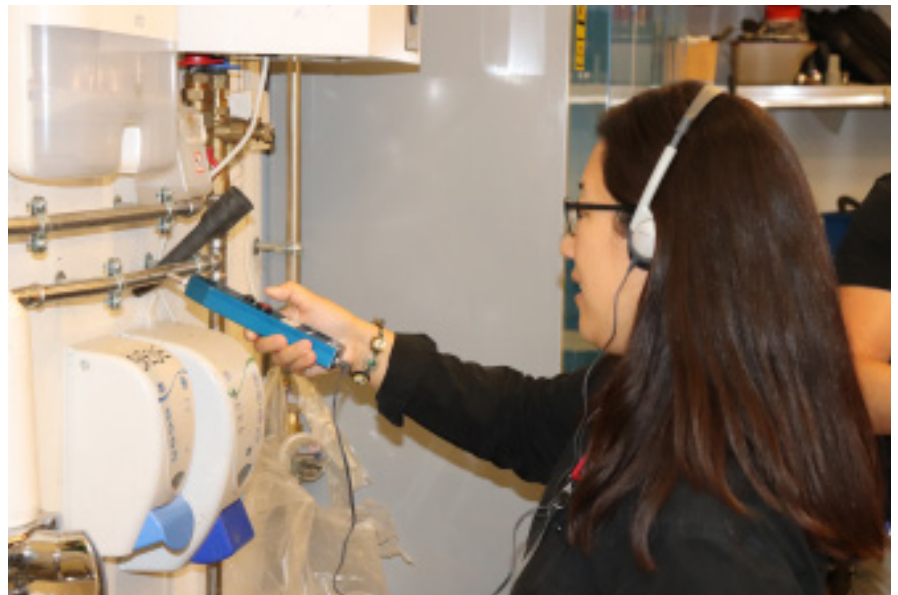
It is no coincidence that the concept of a water management course is developed in Denmark where water technology and treatment processes are pioneering; “We are frontrunners in many areas, when it comes to water. Just take non-revenue water which is a term for produced water that never reaches the end-customer due to pipe leaks or other supply network inefficiencies. In Denmark, this accounts for 6-8 percent. In some places of the world, it accounts for as much as 70 percent. This truly shows the necessity of spreading the knowledge we have. It is, in fact, paramount.”, explains Ramlau-Hansen.

In Denmark, we have a low energy consumption per m³ of drinking water sold, in addition to energy-producing wastewater treatment plants and mapping, protection and administration of the groundwater system.

All in all, a wealth of valuable knowledge that was passed on to the students who had registered in world change upon course enrolment. The course is nominated as a 5-ECTS point-giving course, and the students was facing intensive days of studying and hard work, as they in teams solved authentic water challenges.

The education consisted of three theoretical tracks, which are groundwater, water distribution and wastewater. The students then had the opportunity to put these into practise when trying to solve an authentic task in teams. Thus, during the two weeks, they gained both theoretical knowledge

of global issues and effective solutions, as well as semi-practical experience in how to put that knowledge into action. An incredibly important effort that can convey great change.



By 2030, the global energy consumption will have increased by 50 percent, triggering a rise in water consumption of about 85 percent. In Denmark, we have found a way of using our resources efficiently and carefully, and this knowledge should be given to these students, to actively use them in solving today's and tomorrow's water challenges.”, says global brand manager at AVK, Michael Ramlau-Hansen.

AVK HELPS MARIAGERFJORD

DENMARK

AVK helps Mariagerfjord wastewater plant expand its capacity as well as reducing the environmental impact

*By Bo Ellerup,
Product Manager,
Wastewater Treatment,
AVK International A/S*



Looking at the population growth in the next 25 years, combined with a desire to greatly improve both the economic and environmental benefits of local wastewater treatment, Mariagerfjord Municipality has decided to build a new state of the art wastewater treatment plant. With the supply of a wide variety of valves, AVK is proud to have been part of this newly established plant in the North of Jutland.

Today, the plant treats wastewater from approximately 75,000 population equivalents, but it is constructed to handle a wastewater amount equal to

a population of 110,000, and to meet even stricter environmental legislation in future. The new plant is replacing 10 smaller plants, which in total have treated 5-6 million m³ of wastewater annually where only about 2 million m³ are from citizens and companies. The remaining wastewater is rainwater led into the wastewater sewers. An area that Mariagerfjord Water will optimize by making a 2-string pipeline where the old 1-stringed network still exist and by replacing the combined sewers with separated sewers.

Significantly reducing sludge amounts

Centralising wastewater treatment in a large plant is a growing trend in Denmark. It makes it possible to produce the sludge and then stabilize it in an aerobic process in a digestion tank. Where the organic material is transformed into methane and carbon dioxide. This, considerably reduces sludge amounts making it a huge gain for the environment.

Specifically a 2,000 m³ digestion tank reduces the amount of sludge, as well as producing bio gas that



is transformed to energy used for heating and electricity. The digested sludge is dewatered in decanters and then transported in closed semitrailers, which is a cheap and “smell-safe” way to store the sludge. The cleaning process is so efficient that the discharge of organic materials, nitrogen, and phosphorus is significantly less than the total discharge of the 10 wastewater treatment plants it is replacing.

Eco-friendly discharge

Some of the old wastewater treatment plants discharged their cleaned wastewater into the fjord of Mariager. The maximum permitted amount of phosphorus is about a quarter of that for discharging into the ocean. The new wastewater treatment plant will be leading its cleaned wastewater 3.8 km out in the ocean of Kattegat, but will still comply with the stricter requirements for discharging into a fjord.

Cost effective centralisation

In addition to the environmental advantages of centralising wastewater treatment in a large plant, the cost of optimizing the operations and maintaining the buildings is significantly reduced, compared to that of many small plants distributed at various locations.

Also, by placing the plant 27 meter above sea level and discharging the wastewater through a pressure gravitational network, cleaned wastewater will most often run to Kattegat by gravity, and only if the pressure on the network increases. Installing a pump will help making the pressure on the lines be used.

Construction of the new Mariagerfjord wastewater plant began in March 2012 and was finished in the fall of 2013.



AVK FIRE PRODUCTS INTERNATIONAL PROJECT

GLOBAL



AVK assists in the fire protection of vital stations across a vast, international network delivering natural gas to Turkish and European customers

*By Ismal Sincik
Country manager,
AVK International A/S
Turkey*

Stakeholders from the Azerbaijani, Italian, and Turkish governments are working together with British Petrol (BP) in a project of bringing natural gas from Azerbaijan to Turkey and Europe. The gas will travel through an 1850 km main pipeline system across Turkey. The expected capacity of this massive project is the delivery of 16 billion cubic metres of gas per year. A volume that is anticipated to gradually increase to 31 billion cubic metres annually.

The pipeline has its starting point in the district of Ardahan at the Georgian-Turkish border, where it runs through 20 Turkish provinces before it reaches the Ipsala district of Edirne at the Turkish-Greek border. From here,

the Trans-Adriatic pipeline will join to carry natural gas to European nations. Connection to the natural gas supply network of Turkey is established from off-take stations at Eskişehir and Thrace.

Protecting crucial pipeline stations

More than 10 sections have been tendered in the project and Tekfen Construction and Installation Co., Inc. – an AVK customer – is the contractor for one of these sections. This part of the project covers the compression and metering stations in Turkey, where Tekfen has engineered and constructed two compressor stations and four measuring stations over the pipeline. They preferred the AVK fire protection solutions, consisting of UL and FM approved dry barrel hydrants, gate valves and post indicators for the protection purposes of the stations, which we then have supplied more than 100 sets of.

More specifically, AVK has delivered NRS gate valves with post indicator flange (series 45/59), post indicators (series 34/00) and high pressure dry barrel fire hydrants (series 27/00) for the project. The chosen fire protection range is manufactured in Europe and has an important customer base in Turkish construction companies which serve both Turkey and foreign countries. One of the main criteria for AVK's success within this segment is the availability of UL and FM approved NRS and OS&Y gate valves up to DN400 as well as both dry and wet barrel fire hydrants – all with competitive lead times.

WASTEWATER PUMPING STATION GREEN PROFILE

DENMARK

The oldest and largest pumping station in Denmark has been discontinued and a new one has taken over.

*By Martin Munk Pedersen
Sales Manager,
Vatech 2000*



The original pumping station at Kløvermarken near Copenhagen was from 1901, and as the pumping station could not be temporarily shut down, it would be too difficult to renovate it. To make the pumping station up to date, it was therefore decided to build a completely new pumping station right next to the old one.

Designed with the environment in mind

The new pumping station is designed for climate changes and protected against floods. The design is also considering environmental aspects and the construction includes green roofs and outdoor areas collecting rainwater. Furthermore, heat recovery from the wastewater will provide heat for the pumping station and the next door staff building.

Increased operational reliability

The pumping station is built in a circular design with a diameter of 35 m, it reaches approx. 10 m below ground

and has two 24 metres pressure towers. It is divided into two separate pumping stations with two sumps. This allows for maintenance on one unit at a time and provides an increased operational reliability. Only when it rains, both units will be required to run at the same time.

The largest pumping station in Denmark

Each year, about 35 billion litres of wastewater from 350,000 citizens in the Danish capital Copenhagen are led through the pumping station, and the total capacity is 30,500 m³/h. With these numbers, the pumping station at Kløvermarken is still the largest wastewater pumping station in Denmark. The capacity of the new pumping station is the same as of the previous one which is considered to be sufficient. We are expecting more frequent and more intense cloudbursts but due to a number of cloudburst management projects, the level of rainwater reaching the

pumping station is not expected to increase. Furthermore, the capacity of the pumping station is limited by capacity of the pressure pipes leading wastewater from the pumping station to the nearby treatment plant, and expanding the capacity would require a comprehensive extension of the complete pipe system.

AVK products at the pumping station

Valves and accessories for the new pumping station have been delivered by Vatech 2000 and a lot of AVK gate valves, swing check valves, knife gate valves, dismantling joints and flange adaptors in DN50-1400 are installed at the pumping station. These are mainly shut-off valves and the two DN1400 gate valves are installed at the pipelines leading wastewater from the pumping station to the nearby treatment plant for the purpose of service and maintenance of the pumping station.

AVK DELIVERS TO ONE OF THE LARGEST BATTERY FACTORIES IN EUROPE

HUNGARY

In January 2018, SK Innovation, the third biggest company in South Korea, started building one of the largest battery factories in Europe – a total investment of 280 mill. euro creating 410 new jobs.

*By Tamás Bedegi
Product Manager
AVK International A/S
Hungary*



The factory will produce lithium batteries for electric vehicles and it will be located on a 430,000 square metre site in the industrial park of Komárom in the western part of Hungary.

The new factory is scheduled to commence mass production in the beginning of 2020, and when completed in 2022 the manufactured battery capacity will be around 7.5

GWh per year – able to supply 250,000 cars with batteries.

From the beginning of the planning phase back in 2017, we have been cooperating with the designer providing datasheets, drawings, technical descriptions etc. Later, the contractor OK BAU Kft., one of the biggest special civil engineer companies in Hungary, came to visit our headquarters in

Denmark and thus, got knowledge about the quality and the scope of our product range prior to choosing our solutions for the factory.

Through Paor-Víz Kft., one of our distributors in the Hungarian market, we delivered gate valves and ductile iron fittings for the sprinkler system and gate valves, service connection valves and Supa Maxi™ adapters for the water system as well as extension spindles and surface boxes. All deliveries were completed within two weeks.



LESS IRON AND CALCIUM IN THE DRINKING WATER DE WATERGROEP WATER TREATMENT PLANT

BELGIUM

With more than 100 years of experience and knowledge, De Watergroep is an important partner for drinking water in Flanders. With a pipeline network of over 34,000 kilometres, De Watergroep supplies drinking water to 177 municipalities in West and East Flanders, Flemish Brabant and Limburg.



By Arne van de Ree,
Marketing Assistant

and Stijn Meirlevede,
Sales and Technical Manager,
AVK Belgium

Sustainable water management

Quality and sustainability are very important to De Watergroep. The integrated water company ensures an economically and ecologically sustainable management of the water chain and has several reliable partners who share the same vision

Project info

- Company: De Watergroep
- Location: Eeklo
- Production capacity of the water treatment plant: 240 m³/h
- Date of commissioning: January 2019
- Pressure class: PN10
- Diameter: DN50 to DN800

for sustainable production. Together with companies such as AVK, they do not only ensure better water quality, but they also limit unnecessary water loss by focusing on constant innovation. This makes De Watergroep a reliable partner for achieving the UN sustainable development goal 6 – clean water and sanitation.

Water production in Eeklo

“We use groundwater here,” says Lien Bentein, project leader at De Watergroep. “The groundwater is first aerated, and then softened and de-ironed with a flocculant and additives. Next process is sedimentation and filtering of iron and other particles whereafter the ammonium is nitrified. The last step is active carbon filtration, which ensures further removal of ammonium, manganese and micropollutants. Just before the water leaves the treatment plant, it gets a mild disinfection with sodium hypochlorite to guarantee drinkable water right up to the tap.”

Products

- Centric butterfly valves: mainly pneumatic and electrical control
- Double eccentric butterfly valves: manual operation
- Gate valves
- Check valves
- Knife gate valves
- Air valves
- Dismantling joints

Lien Bentein: “Making groundwater drinkable is a very special process, that we don’t always think about when we turn on the tap at home.”

In the production of potable water, selection of the right equipment is very important. AVK has a very wide product range, and the valves feature low head losses, which means a higher efficiency of the pumps. Combined with the high product quality and durability AVK therefore offers a lower total cost of ownership.

STEEL PURGE POINT VALVES DN250 AND DN300 PIPES

CZECH REPUBLIC



Dense engineering networks and high maintenance requirements are the reality for the gasworks in the two largest cities in the Czech Republic, Prague and Brno, and to improve security, they have installed AVK gate valves with purge points.

*By Milan Lenhart,
Sales and Product Manager, Gas supply, Czech Republic*

The companies who own the gas pipelines – Prazska plynařenská servis distribuce a.s. (Prague) and GridServices - innogy Group (Brno) – have installed AVK steel purge point valves on two steel pipes DN250 and DN300.

Exhausts for bypass and control

AVK steel purge point valves have DN50 exhausts which are used as a bypass to supply a parallel gas pipeline in the event of a malfunction. The exhausts can also be used for control pressure measurements or – in the case of technological interventions in the pipelines – for degassing (gas discharge) and deaeration (air extraction).

The purge point valves are replacing the traditional way of creating purge points which has typically been done by mounting DN25 PE32 pipes on the pipeline. The normal operating pressure of natural gas in the pipeline is up to 4 bar and the DN25 outlets (purge points) usually used by the

customers are inadequate on large gas pipelines. The DN50 exhausts are thus an improvement for the two Czech gas companies, and others indeed, compared to the usual DN25 purge points.

Smooth assembly

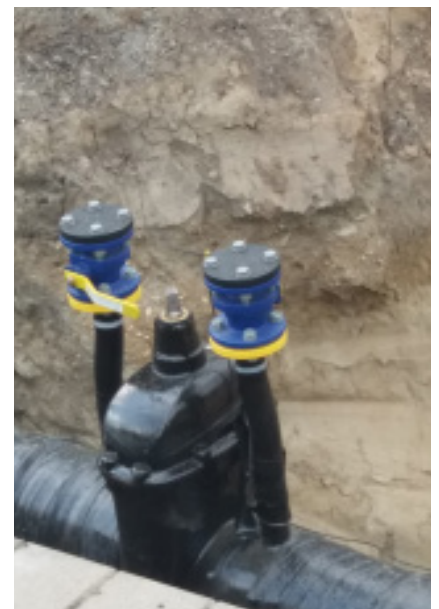
The valves were connected into the existing steel pipes using steel couplings. Some of the old steel pipes were replaced by new PE pipes, and in those cases steel/PE couplings were used for the connections. The assembly went smoothly, and the installations were finalised by adding extension spindles and surface boxes.

Protection against electro galvanic corrosion

Another advantage of AVK steel purge point valves appreciated by the customers is the PUR surface treatment. Due to the dense rail transport of trains and trams in both cities, there is a risk of electro galvanic corrosion. The superior resistance

provided by the coating is therefore important.

To further improve security at their networks, the customers are looking for more suitable locations to install AVK valves. We are looking forward to further extend our partnerships.



AVK VALVES IN LARGE-SCALE HOSPITAL PROJECT

DENMARK

The new university hospital in Odense, New OUH, will be one of the largest new hospitals in Denmark, and the turnkey contract amounts to 953m euros.

*By Kristian Kronborg,
Product Technician,
AVK Danmark*



New OUH will become a hospital of the future and will be part of Campus Odense – a new part of town focusing on innovation and development. In addition to the new university hospital, the new town will host University of Southern Denmark, Science Park Odense and the new Cortex Park supporting knowledge sharing and networking between the business community, the university and the hospital. Generally, innovative thinking characterises the project, and for easy access, new roads are being established and a tramway is being constructed with two planned stops at the new hospital.

Almost 300 AVK valves

The Danish entrepreneur M. J. Eriksson is the lead contractor on the

building and construction work related to the site development, including pipe delivery. The pipe contract covers main lines and house connections for water (2.85 km), wastewater (2.25 km, pressure lines) and cooling (3.67 km) and also includes valves and accessories for the complete project.

All valves and hydrants for the project have been supplied by AVK, mainly gate valves with PE ends for direct welding into PE pipe system, and almost half of them are in DN300-400 to be used for cooling water. Furthermore, flanged valves and ball check valves will be used for the wastewater system, and 12 fire hydrants will be spread over the big site.

The construction of the buildings is most likely to begin in mid-2019, and the new hospital is expected to open in 2022. The first buildings will include beds and treatment sections and the largest, central building will structurally link the hospital and the university.

AVK and Aarhus University hospital

Back in 2009, the construction of the new University Hospital in Aarhus was initiated, and in 2019 the approximately 470,000 m² project was completed. During the development of the 1.25m m² site in Aarhus, AVK valves for more than 500,000 euros have been put in the ground.



NEW GAS VALVES FOR RENOVATION PROJECT ALBERT CHANNEL IN ANTWERP

BELGIUM

Renovation of a gas distribution pipe close to the Antwerp Sportpaleis event venue required three new gate valves DN500.

By Stijn Meirlevede,
Sales and Technical Manager,

and Ellen Jansegers,
Marketing Responsible
AVK Belgium



Renovation of the gas pipe is part of the project to elevate the Theunis bridge. Elevating the bridge will make it possible to enlarge the Albert channel, which is necessary to increase inland shipping.

Gas node loaded with precision

The entire construction of pipes, valves, dismantling joints, gear boxes and extension spindles – a so-called gas node – is welded together and loaded in the trench with a crane. A precise job, since the gas node weighs about 3.2 tonnes and the trench is only two metres wide, eight metres long and two metres deep.

Gate valves easy to handle

Tony Van Dyck, team leader gas at Eandis explains that the street where the gas node is installed is a small, oneway alley that does not have much space inside the trench. And he points out why they chose AVK valves.

“The AVK gate valves have a short face-to-face length and low weight in comparison with other valves. This makes them easy to handle and install.”

*Tony Van Dyck,
team leader gas at Eandis*

Main gas pipe with a pressure of 4 bar

The pressure of the main gas pipe having a nominal pressure of 4 bar needed to be reduced to 25 mbar before installation of the gas node.

Gas pipe below Albert channel by controlled drilling

Before installation of the gas node, a new gas pipe needed to be installed below the Albert channel by a controlled drilling. A trench is not necessary with a controlled drilling, only a beginning and ending shaft. The drilling happens in three steps. First, the drill head is pushed through

a rig in the soil. Then the drilling hole is enlarged. Last, the gas pipe is pulled through the drilling hole with utmost precision.

Elevation of Albert channel

The Albert channel is one of the most important river channels in Belgium. It connects Liège to Antwerp. Yearly, the channel transports over 40 million tonnes of goods. EU directs that the entire channel should have a free passage height of 9.1 meter. With this, barges with four layers of containers can pass smoothly and safely. To meet this directive, all bridges across the Albert channel need to be elevated.

Project details

Company: Eandis
Location: Antwerp Sportpaleis
Installation: May 2018
AVK products: three AVK gate valves for gas distribution

Pressure class: PN16
Diameter: DN500

AVK VALVES IN THE MACTAN-CEBU INTERNATIONAL AIRPORT

PHILIPPINES

AVK valves were installed in the Mactan-Cebu International Airport (MCIA) Terminal 2 located in the southern part of the Philippine Islands. Built and operated by the GMR-Megawide consortium (a joint venture between a local company and an Indian conglomerate), the international airport is a Php 17.5-Billion passenger terminal which is made of wooden arches appearing like an inverted boat hull and wave-like roofing that elicits tropical and resort-like feeling.

*By Ruel G. Estacio,
Product Manager,
AVK Philippines*

The resort-themed international airport will cater to 26 airlines that will fly to more than 30 destinations, both local and international according to local airport officials. It has a floor space of 65,000 square metres and expected to reduce congestion at the original airport with an increase in the annual passenger capacity from 4.5 million to 12.2 million. Before, the MCIA, which is the second largest airport in the Philippines, handled 5.9 million



passengers per year which is far more than its original capacity.

AVK valves for air-conditioning (ICV) and plumbing (AVK) were technically approved after a series of compliance from Arup Hong Kong who is the official mechanical works consultant for the project. A variety of valves and accessories were included in the order. This will be the second airport project for AVK Philippines Inc., the first one

being a domestic airport also located in southern Philippines.

EXCELLENT QUALITY OUTBATTILING HARSH CONDITIONS

CHINA



AVK valves proving their worth against competing products in a Chinese wastewater project. In China, environmental protection has become an important part of the national policy and strategy throughout recent years. The HeXian HuaQi chemical industry wastewater treatment plant which was built in September 2016 is a direct outcome of this increased environmental focus.

*By Ken Yan,
BD & Marketing Director,
AVK Valves (Shanghai) Co. Ltd.*

The wastewater treatment plant has the capacity of over five thousand tons of water per day, and has a rather complex task of treating the input water from the surrounding industrial area due to the dozens of chemical enterprises located here. The water has a very strong pH value, a deep colour, high levels of NH₃-N and toxicity, and a fluctuating input of water volumes.

Considering all those factors, the project owner adopted a composite technology including a tank for pH adjustment, traditional A20, an ozone oxidation tank and a BAF tank. After treatment, the water quality has been kept at COD ≤ 50mg/L and NH₃-N ≤ 1mg/L for the past two years.

Expert solutions and quality products

According to the project owner, the reason for choosing AVK was due to the ability of providing a total system solution. To meet the different processing techniques, AVK provided a total of 156 valves including concentric butterfly valves of manual and electrical actuation in upstream process to meet the extreme pH water, double eccentric butterfly valves for the downstream process to meet the high capacity output, and a large quantity of ball check valves and gate valves throughout the system.

Choosing quality pays off... it is profitable in the long term

Due to the very strict project deadline set by the local government, the project owner first decided to use knife

gate valves of a local brand, as they were on stock and easily accessible. Nevertheless, only half a year later these valves were facing very serious corrosion, and the product owner was forced to stop the production and have the knife gate valves replaced – an update directly causing a discharge of unqualified wastewater during the rehabilitation time, which was then followed by a fee imposed by the local environmental office.

The valves provided by AVK, however, were and are still of high quality and full functionality.

Due to the focus on high quality in all aspects of the plant, the project has now been evaluated as one of 23 excellent wastewater treatment plants in China by E20, which is a leading environment association in China.

SARAJEVO WATER PROJECT – REDUCING UNINVOICED WATER IN CANTON

BOSNIA & HERZEGOVINA

To detect and reduce uninvoiced water in Canton Sarajevo (project NRW) as well as to collect data on water flow, pressure in the water line etc. The project predicted the design and construction of DMA shafts holding measuring and regulating equipment.

*By Branislav Milošević,
Regional Manager, Balkan
AVK International A/S*



In the first phase of the project, a bypass was created using two tee pieces and a gate valve. The mentioned tees connect the main line to the bypass on which the measuring and measure/regulating shafts are to be constructed. The following phases projected the purchase and installation of measuring, regulating and operating equipment.

The basepoint of the project is the constant measurement of all parameters in the water work system, the storing and analysis of the collected data while acknowledging the basic parameters of the system. The analysis aids the rationalization processes in specific areas, as well as practical activities for relieving the detected issues in order to manage water in the best way.

The project goal is to precisely define activities and operations to be undertaken in order to use the available modern equipment in the optimal manner, while measuring and monitoring consumption, decreasing loss and increasing efficiency.

Water consumption and pressure measurements are not only for the purpose of precise logging but also for the purpose of retrieving useful and operational data, which will be tracked permanently by the hour and inserted into the database. The database will serve as insight to the user while reaching valuable management decisions relating to water loss, but also interventions. Both will enhance the service of the public water work system and with the use of modern monitoring technology it

is possible to ensure tracing, analysis and planning of all parameters leading to an efficient system functioning towards the end user or its overall functions and vital segments. This allows for creation of a „subsystem for monitoring“ within the existing water work system, the quantification and precise location of loss zones, but also allows for postulates for quality work in discovering loss by the means of the „minimal night flow“ method.

WASTEWATER TREATMENT UPGRADATION PROGRAM WITH SYDNEY WATER CORPORATION

AUSTRALIA



Sydney Water Corporation invested at the Lower South Creek wastewater system in Sydney's South West. The upgrade to the infrastructure will enable the wastewater system to support an additional 500,000 people in the area by 2040.

*By Simon English
Sales Manager,
AVK Flow Control Pty Ltd*

The Lower South Creek Treatment Program will provide new and upgraded infrastructure to improve quality, capacity and reliability to three wastewater treatment plants (WTPs) – Riverstone, Quakers Hill and St Mary's – located northwest of Parramatta in Sydney's rapidly expanding north-western region.

Leading the way

The project will also be Sydney Water's first to undertake an independent sustainability certification under the Infrastructure Sustainability Council of Australia's IS rating tool. Leading edge wastewater technology will be used at Quakers Hill. It is energy efficient and has a significantly lower carbon footprint than the standard technology. The project was supported locally by AVK Flow Control and our manufacturing partners Wouter Witzel and ORBINOX products where we delivered:

- 4 x DN1050 WOUTER WITZEL EVFS vulcanised liner butterfly valves with pneumatic actuators, limit switch boxes and solenoid valves.
- 4 x DN1050 ORBINOX EX model knifegate valves complete with auma electric actuator with profibus protocol communication.
- 6 x DN600 ORBINOX BT knife gate valves – All 316 SS with NBR liners and bevel gearboxes.

These valves are to Sydney Water specifications and supplied with full documentation - ITP, GA drawings, and 3.1 certification.

We look forward to the upcoming installation, commissioning and expect a long, reliable and quality service to Sydney Water.



SUSTAINABLE WATER... FOR SUSTAINABLE DEVELOPMENT

SAUDI ARABIA



AVK Saudi Valves Manufacturing Co. participated in Saudi Water Forum under the patronage of H.E. Eng. Abdulrahman bin Abdulmohsen Al-Fadley – the Minister of Environment Water & Agriculture.

*By Khloud Aiash
Content Marketing Manager,
AVK Saudi Valves Manufacturing Co.
Ltd.*

Saudi Water Forum March 2019, held under the theme of “Sustainable Water.. for Sustainable Development”, sheds the light on the current efforts and future directions within the water sector according to the Kingdom’s Vision 2030 and National Water Strategy. SWF provides a meeting platform for water sector leaders, local and international experts, developers, investors, scientists and researchers, with all concerned stakeholders including the Ministry of Environment, Water and Agriculture (MEWA), Saline Water Conversion Corporation (SWCC), National Water Company (NWC), Water

and Electricity Corporation (WEC) and the Saudi Irrigation Organization.

AVK Saudi shared with the Forum visitors and water authorities their expertise and successful practices with the aim of finding the best solutions for water sector challenges and developing water projects that meet the Kingdom’s needs. Moreover, SWF offers various investment opportunities to develop this vital sector and to encourage the private sector in the Kingdom.



CILCAIN PROJECT INVICTA'S SOLUTION

UNITED KINGDOM

92 metres of bespoke spindles and new valves installed in just 4 days. Invicta designs and installs drainage solution for remote Welsh reservoir.

*By Andrew Izod,
Managing Director,
Invicta Valves Ltd*



Cilcain is a small, pretty village in North Wales close to Mold and about 16 miles North West of Wrexham. It sits at the foot of Moel Famau, the highest peak in Flintshire. Above Cilcain are a number of small reservoirs. No longer an active part of the potable water supply in the region, the reservoirs are primarily used for fly fishing.

The valves used to control the level of water in one of the reservoirs needed replacing. Invicta was asked to design and install a solution by William Hughes, the civils contractor on the project.

The principal problem faced by Dan Brown, the Invicta engineer tasked with solving the challenge, was that the plinth on which the valves were to sit was over 40 metres away from the control chamber located on top of the dam wall. The solution was to run two 46m-long control 'guides' down from the control chamber to the two multi-turn gate valves.

Invicta had undertaken a similar project in Birmingham in June 2018. The chosen solution on that occasion was to fabricate the bracketry and steelwork on site which proved more complicated than anticipated. Feedback from the Invicta site team indicated that for the Cilcain project it would be simpler and more effective to design and fabricate the steelwork at Invicta's workshops in Maidstone and then transport it to site: rather like a giant Meccano kit.

The civils contractor installed support plinths down the sloping face of the dam wall in line with Dan Brown's design:

"My goal was to make the system as straightforward as possible for the Invicta team to install, with as little cutting, drilling or welding as possible on site. The bracketry, stems and guide supports were all fabricated in 304L stainless steel to minimise long-term corrosion. All bushings were in HDPE

and laid out alongside the fabrication shop to ensure the connecting flanges on the guides were positioned correctly a safe distance from the brackets and the support plinths. Bolting was A2 stainless steel with Nyloc inserts to ensure nothing could come loose."

The entire assembly was designed in 3D in our SolidWorks CAD programme. The use of 3D enabled Invicta to present the design to its client and Welsh Water in a way that all parties could easily visualise.

We worked closely with Welsh Water and William Hughes, using their civils drawings and advising them of the groundworks design, plinth angle and a few unforeseen issues too. Logistics was also a challenge due to the remote nature of the reservoir. The nearest postcode directed carriers to the wrong side of the village, so special arrangements were made to deliver the 6m lengths of spindles, plant and other materials.

I attended site to scope it out and take measurements before the engineers arrived and I returned to witness the final testing and sign off; all part of the Invicta Valves service! The gate valve

operation is straightforward. A T-key is used to turn the spindle via a gearbox. The gearbox has a 3:1 operation which means that 66 turns are required to fully open the valves. The cost and

disruption associated with draining the reservoir to undertake the works meant that two 250mm gate valves were installed to ensure there was redundancy within the control system.



ALL IN A DAY'S WORK: FROM CADENT EMERGENCY SUPPORT TO CADENT CUSTOMER

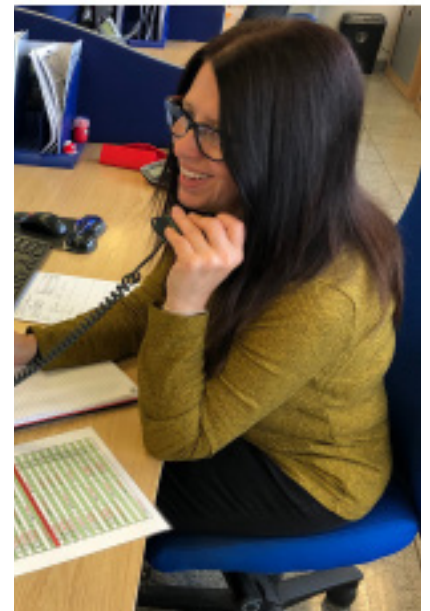
By Jon Briafield,
Market Sector Manager, Gas,
AVK UK

AVK's series 85 Donkin Certus valve to the rescue and secures gas leak.

When the National Gas Emergency Service, run by Cadent, ring the AVK emergency repair clamp fittings hotline, the call is answered by Julie Hyland. AVK's rapid response team put emergency orders into action immediately and Julie makes sure the required repair clamps and under-pressure tees arrive on site as quickly as possible; anywhere across the UK... including Brampton, Chesterfield where Julie lives!

When the team installing a Smart meter in her cellar detected a gas leak, they immediately evacuated Julie's mum, who was housesitting at the time and called out the 'National Gas Emergency Service' run by Cadent. A corroded gas entry pipe was

diagnosed as the source of the leak and the repair team set to, by digging up Julie's garden path and installing an AVK UK Donkin Certus valve and access chamber. The Certus valve enabled the team to isolate the gas supply to the cellar, a PE to steel entry pipe was installed and the gas was reconnected – all in one afternoon.



"The service from the Cadent team was brilliant and I think they were surprised to come across someone who knew more about the products they were installing than they did!" commented Julie. "They even suggested I might like to help out by doing the electro-fusion jointing. It was really interesting to see the emergency team in action as it 'closed the loop' on the service I provide every day as part of my job."

WHY DOES AVK SOUTHERN AFRICA DEDICATE 67 MINUTES?

SOUTH AFRICA

Nelson Mandela has been making an imprint on the world for 67 years, beginning in 1942 when he first started to campaign for the human rights of every South African. His life has been an inspiration to the world.” Mandela was intensely involved in anti-apartheid activities and he served 27 years in prison for the cause. In November 2009, the United Nations declared the day of his birth as Nelson Mandela International Day as a way to honor his legacy.

*By Sayuri Naidoo,
Marketing Manager
AVK Southern Africa*



By dedicating 67 minutes of our time – one for every year of Mandela’s service – our people can give back to the world around them and make a contribution to global humanitarianism.

course – where employees dedicated 67 minutes of their time to making a difference.



This year, we supported the Thokoza Retirement Centre, nearby AVK’s Johannesburg office, by providing breakfast meals to 110 senior citizens. A sandwich production line was set up in AVK’s canteen – a very lean one of



SERIES 766 AWWA DOUBLE ECCENTRIC BUTTERFLY VALVE 24"-48"

GLOBAL

We are very pleased to announce the release of the Series 766 AWWA Double Eccentric Butterfly Valve 24" - 48". It is designed acc. to AWWA C504 with two sealing types (Seal-on-disc or Seal-in-body) and two connection ways (Double flanged or AWWA C111 Mechanical Joints).

*By Kevin Ouyang,
Technical Marketing Manager,
AVK Valves (Anhui) Co., Ltd*

It is also certified by NSF to NSF/ANSI 61 and NSF/ANSI 372 for use in drinking water. The Series 766 can be used for drinking water and other neutral liquids to max. 70°C. Main features are as following.

- Disc fixed to the shaft to prevent fluttering
 - Disc seal profile and rubber quality ensure low closing torque
 - All rubber parts drinking water approved by multiple institutes
 - All fasteners are 316 stainless steel (A4)
 - Replaceable stainless steel seat ring and O-ring shaft seal
 - Rubber seal in body is fixed with epoxy while rubber seal on disc is o-ring type held by a stainless steel ring.
 - Stainless steel shafts 431 for Class 150 and 17-4PH for Class 250 with self-lubricating PTFE/bronze composite radial bearings
 - Shaft ends are inserted into the disc 1.5 times the shaft diameter and fixed with dowels; the dowels are sealed with O-rings for corrosion protection and a security plate keeps them in position. Key and keyway provided as backup for the dowels.
 - The double eccentric disc releases the compression of the seal after a few degrees of opening increasing durability and reducing operating torque (Seal on disc)
 - Rubber seat located in body with epoxy on the back of the seal for optimal compression control - on-site epoxy re-fill is possible in case of seat leakage (Seal in body)
- Body and disc of ductile iron coated with fusion bonded epoxy (FBE) to AWWA C550, GSK, and approved by WRAS-DVGW/W270/UBA (Seal on disc)
 - Body and disc of ductile iron coated with wet type epoxy that meets or exceeds AWWA C550 (Seal in body)



Please do not hesitate to contact us, if you have any questions.

For prices and lead time, please contact Gallary Chen (gallarychen@avkanhui.com).

If any support you need for promoting such kind of valves, please feel free to contact kevin@avkanhui.com

COMPETITION



We are happy to announce that the winners of the competition in AVK Interlink no. 51 are:

- Henry Scheffel, AVK Nederland B.V. Netherlands
- Juliano Moraes, AVK Válvulas do Brasil, Brasil
- Omar Jess, Arabi Company W.L.L. Kuwait

Gifts are on their way.

The correct answer is: AVK Serie 55 resilient seated gate valve (DN800)

New competition:

On which dates was (WATEC) summer school "Advanced Water Cycle Management Course" hosted?

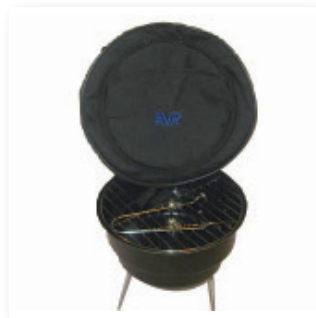
Send an e-mail with the correct answer in which you state your address and the gift you would like to receive – if you win.

E-mail to: lios@avk.dk

Choose between:



Krenit bowl, black with red or yellow on the inside Ø12.5 cm



Picnic grill in a cooler bag



Glass decanter

AVK Holding A/S

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