

Muslim Engineers' Network (MEngN) Newsletter

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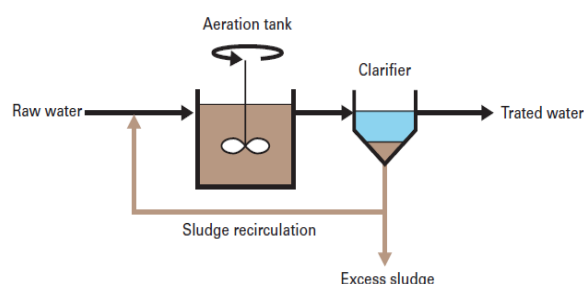
“Allah has promised those who believe and do righteous deeds [that] for them there is forgiveness and great reward.”

- (Quran 5:9)

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Wastewater Treatment

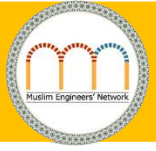
By Mohammed Haroon Siyech

Through the COVID-19 pandemic of 2020, you may have come across an interesting news story from the Netherlands related to a possible mass testing methodology. Researchers found that sampling and analyzing the raw sewage at the inlet of wastewater treatment facilities could provide clues as to the number of people infected within the catchment area of the wastewater plant. While it is a surprising methodology, it is a sign of times what with wastewater plants which were traditionally considered a resource sink evolving into resource neutral or even resource positive facilities.

Indeed the Water Environment Federation (WEF), the umbrella body for professionals in the water and wastewater treatment field in USA has dropped the term “Wastewater Treatment Facility” from its literature and lexicon and adopted the term “Water Resource Recovery Facility” to highlight and promote this drive. In this piece I take a look at some of the reasons for this shift by providing an insight into the process design basis for wastewater plants.

Wastewater treatment plants were originally designed to remove organic matter of human fecal origin before being discharged into public water bodies. Organics in the untreated sewage has the potential to degrade biologically and in the process consume oxygen from the receiving bodies resulting in adverse living conditions for aquatic matter. The wastewater also carries enteric pathogens that if untreated can result in disease outbreak for communities beside the discharge locations. Hence wastewater treatment was and is important from both an environmental and public health perspective.

The simplest way to treat the sewage was to screen and aerate the water that is collected by the sewage systems before discharging it into the environment. Since the 70s and the 80s however, biological nutrient removal has become an increasingly important goal of wastewater treatment.



The nutrients in question are Nitrogen (in the form of Ammonia and organic nitrogen from urine) and Phosphorus (dissolved or particulate). Just as Nitrogen and Phosphorous form important nutrients for human consumption, they also promote algal growth in water bodies that receive nutrient rich wastewater.

These nutrient loads result in a process called eutrophication or the exponential growth of algae that appear as a blue green film on the surface of water bodies and consume available oxygen while blocking sunlight from penetrating the surface. These blooms are unsightly, can stretch for miles and severely impact the aquatic life in water bodies in which they proliferate. In order to remove these organics and nutrients, wastewater engineers employ various microbiological species that consume them for their life and growth processes.

The industry workhorse for the past many years has been the Activated Sludge Process whereby microbial growth of varied species is promoted by feeding on the dissolved organics in one set of tanks. The mass of organisms also has the property of forming flocs in the process tend to incorporate the inorganic non-biodegradable particulates that settle well and. These flocs are led to large clarifiers where the clarified effluent is collected and sent downstream for further filtering, disinfection and discharge. The sludge collected at the bottom has to be further treated before being disposed in landfills.

The microbes that are “employed” in the treatment process require specific environmental conditions to grow that can often times be in contrast with each other. For example, organics are removed by heterotrophic bacteria that reproduce and grow at a much faster rate than autotrophic bacteria which are required to degrade Ammonia (both of which are in the order of days). These competing conditions and the need to promote growth of various types of bacteria as well as have the biomass settle result in wastewater plants having large civil tanks to meet the long hydraulic and solid retention times. At the same time, with wastewater inflows to a plant following a diurnal peaking pattern (up to two times of the average flow for large plants), the tankage required to handle these flows are further increased.

Costs associated with municipal wastewater treatment aren’t just capital intensive. In order to degrade the organics and ammonia, a proportional amount of oxygen needs to be continuously supplied to the wastewater. The amount of oxygen required and the efficiency of aeration system are two important parameters that determine the operating costs associated with the plant. Roughly though, aeration contributes up to 50 – 60% of the operating cost of the plant with pumping forming another 20% of the costs.

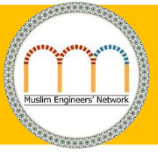
Given that wastewater plants can consume anywhere between 20kWh – 45 kWh / per capita per annum every percentage improvement in efficiency is important for a municipality catering to large populations in major towns and cities. While electricity costs are high in much of the developed world, in developing countries these problems can become more acute due to unreliable and discontinuous power supply. Thus with municipalities having to spend public money from taxes to build the plants and then charging the inhabitants a fee to operate them, it is of utmost importance that the requirements and costs to treat wastewater are optimized if not minimized.

With population in cities around the world burgeoning due to economic migration from rural to urban areas, the provision of wastewater treatment systems forms the difference between well maintained public sanitation system or its lack thereof. With a global average of 200Litres and a 60g Organic Load on a per capita per day basis received at the wastewater plants, they will continue to form a big resource sink for municipalities and governments. In this context, the earlier stated shift in perspective from merely treatment to meet public health and hygiene goals to recovering any and every valuable resource from the wastewater to make it self-sustaining while at the same time reducing capital investments is not a luxury but a necessity.

Some of the options that are being studied or have been implemented to achieve the goal of resource recovery are - treating wastewater up to potable reuse standards, extracting energy from the organics to power the wastewater plants, reducing the energy costs associated with nitrogen removal and extracting phosphorous to sell and generate a revenue stream. Future articles will delve deeper into the process design aspects of these systems and look at the maturity of the technologies that can improve resource efficiency.

How to be a Muslim in the workplace

By Javed Hason and Abdullah Talukdar



At a primary school in North London in the 1960's I remember being the only Muslim pupil. In fact, I was probably the only non-Christian and the only one who would not participate in singing hymns.

By the time I went to secondary school, the situation became only slightly better. I was blessed with the company of two other Muslims; one whose family originated from Mauritius and the other from Trinidad, with myself being of Pakistani heritage. We were always a wonder to our teachers and friends who found it amazing that although our families were from different parts of the world, all three of us celebrated the same festivals.

A lot of graduates are now fortunate to have studied at school with large proportion of Muslim students, and there are now many more Muslims moving onto university.

When I left for university, I was surprised to notice the ISOC was very strong. Although home grown Muslims were few, overseas Muslims made the large bulk of the ISOC population. These days the number of home Muslim students is much larger and the ISOC's stronger as a result.

So many Muslims entering the workforce now will have grown up in the presence of large Muslim networks both at school and university making practicing their faith easier. So it may come as no surprise that many new graduates suddenly find themselves isolated when joining the corporate world. This was the same situation I faced at school in the 1960's. But as a child, I had no inhibitions or fears about being different. Now after 35 years in industry I offer the following advice.

First of all recognise that in this new situation shaytan will constantly whisper to you that you are in a different world where you may need to abandon some principles. What happens when prayer times coincide with meetings? How do you get out of an important group meeting which your manager has decided to hold in a pub? How can you disappear for a longer lunch break on Friday to attend juma prayer? If you are constantly 'different' will you cease to be seen as a team player?

My first advice is that all reputable managers do not care if you pray, wear a hijab, have a beard or fast during Ramadan. They will worry about whether you are punctual, enthusiastic, disciplined, dependable and a pleasant person to be around. Moreover, they want to know if you can complete a given task at a very high quality in the time frame allocated. All of these qualities are consistent or even a requirement of our deen.

Second do not neglect your prayers or any other aspect of your deen but be flexible to the extent that our religion allows. On a busy day complete your compulsory prayers and return back to work. Most employers will provide prayer rooms. If not find a quiet place for 15 minutes to pray that will not block a fire escape route or book a meeting room. Don't short change your employer on the hours you are contracted for on account of excessively long prayers. Most employers are fair. My employer wrote into my contract that I will be allowed a longer lunch break on Fridays provided I make up the time.

Be smart, be presentable and be polite. An employer will assess whether they are comfortable with you representing the company in front of a customer. In all honesty I have never come across any type of discrimination on account of my faith. All the companies I have worked for have been accommodating to Muslims. They have given us a trust and we should not abuse that trust. Those of us working in the UK will be in a company where the employees are predominantly non-Muslims. In some cases, we may be the only Muslim there. Recognise that that for all your non-Muslim colleagues you are the face of Islam. This is a fantastic opportunity for dawa just by being a role model.

Now to answer an earlier question, what happens if a meeting is arranged in a pub? This happened to me; after politely declining to attend our manager shifted the meeting and celebratory lunch to a halal restaurant. How do you avoid social and networking events arranged in bars? In some cases my Muslim friends and I have taken the lead and arranged events in a halal setting. Ultimately though, what if a manager or employer does discriminate?

The advice I was given by my father was: "Do your work to the highest level of excellence and get an excellent reputation for being a hard worker, so that if you are discriminated against simply for being Muslim, this will become obvious to everyone".

"Do your work to the highest level of excellence and get an excellent reputation for being a hard worker, so that if you are discriminated against simply for being Muslim, this will become obvious to everyone"



Islam is a religion that teaches us not to waste a single second of our lives. The Prophet Muhammad ﷺ said, *"It is from the excellence of a person's Islam that he shuns that which is of no benefit to him (in this world or in the hereafter)."* (At-Tirmidhi) We are taught that after fulfilling all our obligations towards Allah and His creation, we should occupy our remaining time productively. Every second is an opportunity to either better our worldly affairs for the sake of Allah, benefit others or invest in the hereafter.

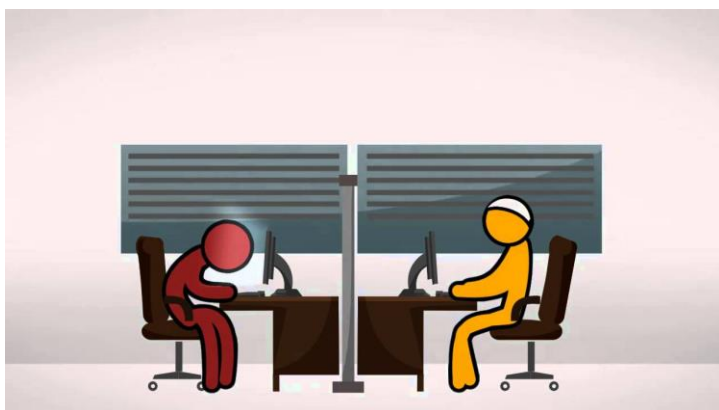
A Muslim does not waste time!

A Muslim is dedicated towards building a beneficial legacy for himself, his family and the whole of mankind. The best of mankind ﷺ said, *"The best of people is the one who is most beneficial to the people."* (Ibn Hibbaan)

The example of Muslim productivity is second to none. Throughout history, Muslims have always been motivated, productive and have aspired to be the best in all fields and walks of life for the sake of Allah and the benefit of others. Below I would like to mention only a few inspirational individuals who utilised their time valuably and became from the most productive and influential individuals in history.

Abu Ali Al-Hussain Ibn Sina (Avicenna) - The Great Physician

Ibn Sina was one of the most eminent Muslim physicians and philosophers of his time, whose influence on Islamic and European medicine persisted for centuries. The Europeans called him the 'Prince of Physicians'. He wrote up to 400 titles, of which some are lost. His most notable work, 'Al-Qanun Fit Tibb' (The Canon of Medicine), a one million-word medical encyclopaedia, is the most influential medical book ever written by a Muslim physician.



Productivity =

Focus X Energy X Time

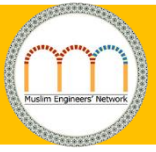
(Towards maximizing reward in the Akhirah)

Abul 'Izz Ismail Ibn Ar-Razzaz Al-Jazari - The Great Mechanical Engineer

Al-Jazari Was a prominent medieval polymath and mechanical engineer from Turkey. The engineering genius who, among many famous inventions, designed and built a programmable humanoid. His most significant invention was the revolutionary crank connecting rod. By converting rotary motion to linear motion, the crank enabled the lifting of heavy objects with relative ease. This powerful technology pioneered by Al-Jazari in the 12th century was soon adopted globally, resulting in everything from the modern bicycle to the internal combustion engine. Al-Jazari also developed the earliest water supply system powered by gears and hydropower. He was a scholar, an inventor, a mathematical engineer, an artist and mathematician. He is best remembered for his work entitled 'The book of knowledge of ingenious mechanical devices' in which he provides details of 100 mechanical devices.

Muhammad Ibn Musa Al-Khwarizmi - The Father of Algebra

Al-Khwarizmi was one of the greatest scientific minds of the medieval period and an important Muslim mathematician who was also known as the 'Father of Algebra'. His most notable work is the book 'Al-Kitab Al-Mukhtasar Fi Hisab Al-Jabr Wal-Muqabala' (The Compendious Book on Calculation by Completion and Balancing). It is from this title the term algebra was derived. His works were translated into Latin and introduced to the Europeans in the 12th century and served as the foundation of modern-day algebra, which plays a vital role in today's technology and programming.



There is a long list of productive Muslim pioneers and masterminds who have tremendously shaped the worldly advancements we witness today. Their legacy will remain for others to benefit from and they will continue to gain reward until the last day.

Key qualities found in all successful Muslim masterminds

1. Faith and dedication towards Islam
2. Sincerity of intention
3. Time management
4. High aspirations and commitment
5. Utilisation of available resources

Likewise, we should all strive to occupy our time in positive and productive work to leave a legacy behind which will benefit us and others till the day of judgement.

“Every second is an opportunity to either better our worldly affairs for the sake of Allah, benefit others or invest in the hereafter.”

- ✓ Time Management
- ✓ Break Your Task
- ✓ Pray About it
- ✓ Don't Give Up
- ✓ Fear Allah
- ✓ Remembrance of Allah
- ✓ Avoid Distraction
- ✓ Mingle With Productive People
- ✓ Sleep More

**To contribute to future newsletters,
please do not hesitate to contact us!**

To keep up engaging topics and articles for future newsletter issues, we need your help! The current plan for newsletter topics is as follows:

- trending industrial topics i.e. new technology or innovation
- specific experience you have had recently
- thoughts or opinion of the industry with COVID-19 or extend of impact of COVID-19
- story of a successful Muslim engineer in the industry.

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