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TECHNICAL SESSIONS

TP 23-01 - History of Cooling Towers: A Historical Perspective

1/30/23 - 8:30 AM...pg. 1

Will provide details of the evolution of evaporative cooling tower designs, installations and applications starting with the first installation dating back to the beginning of the 19th century. Advancement of materials for construction, performance improvement, water use/conservation, and reduction of environmental impact will also be included.

FRANK MICHELL
Retired

Frank Michell recently retired from American Electric Power (AEP). Prior to retiring, Frank Managed the Applications Engineering and Balance of Plant Mechanical Equipment Group in the Engineering Services Organization; responsible for providing engineering services to AEP's Fossil Hydro Generating Fleet in the areas of Mechanical Engineering Analysis (fluid mechanics, thermodynamics, heat transfer, stress analysis & CFD modeling), fire protection engineering and balance of plant mechanical equipment & system expertise/design basis for pumps, heat exchangers, cooling towers, HVAC & dust collection and other misc. equipment. Frank is active in several Industry Organizations including the Cooling Technology Institute (CTI), Electric Power Research Institute (EPRI) and the American Society of Mechanical Engineers (ASME). After retiring from AEP, Frank formed Power Industry Consulting, LLC. Frank holds a Bachelor of Science Degree in Mechanical Engineering from Polytechnic Institute of New York.

TP 23-02 - What Went Wrong with my Mass Balance Calculations of Evaporation

1/30/23 - 9:00 AM...pg. 24

Water conservation is becoming increasingly important. In some cases, facilities are being driven to zero blowdown or zero liquid discharge (ZLD). These constraints impose limitations on the amount of makeup water that can be utilized. The often employed rule of thumb that evaporation is equal to the {circulation rate (gpm) X range (deg F) x 0.85}/1000 is inaccurate and insufficient for predictive and planning purposes. In fact, evaporation is quite variable according to the specific thermal conditions for a given case. Factors such as site elevation and salinity of the cooling water also need to be be taken into account. In this paper, the authors will present methodology for accurate determnations of evaporation.

ALLEN FELTZIN
Becht, Inc.

Al Feltzin has over 35 years of experience in process engineering, maintenance, operations, and construction in large scale industrial plants based on his long career with BOC Gases, Murray Hill, New Jersey. He developed world class, state of the art cooling systems which were installed at over 80 sites in North America. These served as the models for Best Practices globally.

TP 23-03 - Extended Testing on a Real-World Fill Fouling Test Rig

1/30/23 - 9:00 AM ...pg. 31

JOHAN KOTZÉ
TF Design (Pty) Ltd.

Eskom's coal-fired power stations mostly have natural draft wet cooling towers, where excessive fouling results in maintenance and performance issues. Eskom is in the process of replacing the asbestos fill in selected cooling towers, had to evaluate potential replacement fills. A set of four test rigs have been built that simulate conditions within a natural draft wet cooling tower. Water tapped from a cooling tower is used in the test. Both the fouling and thermal performance of the fills are measured as fouling occurs over time. A previous CTI paper (TP19-05), outlined the facility. From the publication of that paper, the rig ran for two years, testing six fills. This paper presents these results, and some conclusions that could be drawn from these results.

Johan Kotzé is a Director at TF Design (Pty) Ltd, and has been driving the ESKOM fill fouling rig project form TFD's side from the beginning. He obtained his PhD from Stellenbosch University in 2014. His research pioneered the use of metallic phase change materials for isothermal energy storage with eutectic molten metals as heat transfer fluids in concentrating solar power (CSP) applications.

TP 23-04 - A New Solution for Mitigation of Performance Degradation due to Cooling Tower System Stresses

1/30/23 - 9:30 AM...pg. 53

MATHEUS PASCHOALINO
Solugen, Inc.

The non-chromate, phosphorus-based, cooling tower corrosion inhibitor formulations that are in wide use today, often suffer from performance degradation due to system stresses. These stresses can be mechanical factors, operational factors, or chemical factors. Today's programs function through controlled precipitation and require the maintenance of moderate levels of supersaturation, enabled by anti-precipitation inhibitors. In many instances, the issues previously listed do not allow for a usable operating condition. Previously, molybdate has been known to be used for its ability to boost carbon steel corrosion without increasing scaling tendencies. However, molybdate is expensive, and has some environmental liabilities. The following paper describes an alternative to Molybdate. This revolutionary chemical is domestically produced from sustainable feedstocks, has very low toxicity, and a favorable environmental profile. This chemical functions as a soluble corrosion inhibitor which can enhance the performance of phosphorus- containing formulations without increasing scale formation. The performance of the chemical along with the commonly encountered stress axes is described.

Matheus Paschoalino is the IWT Tech. Support Manager for Solugen. He received his doctoral degree from the University of Campinas (Brazil), including a stage at the University Complutense of Madrid (Spain). He has eighteen years of experience in Research, Development, and Technical Support on industrial water treatment technologies focusing on delivering asset integrity solutions for a wide range of markets. He is author of five patents, one book chapter and 30+ published papers and presentations from various international conferences

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Be a part of next year's program by submitting a paper to be presented at the 2024 CTI Annual Conference in Houston, TX at the Westin Galleria.

Abstract forms can be found online at www.cti.org and submitted for approval by the Program Committee. A schedule of deadlines for authors as well as a speaker's manual and other documentation will be available later in 2023.

Start planning today. Presentation space is limited!

TP 23-05 - FRP-Carbon Twin Shaft for Axial Fan Blades and Validation of Cofimco's 38ft Test Rig

1/30/23 - 9:30 AM ...pg. 64

Cofimco extensive research and laboratory tests pointed out in the development of an innovative shaft to connect the blade airfoils to the hub on large axial fans used on cooling towers and air-cooled condensers: the pultruded FRP-Carbon twin shank. This type of connection gives to the blade very high strength by optimizing the material distribution in a peculiar shaft shape and maintaining all the advantages of pultruded FRP-Carbon material as the reduction of the vibrations and the high chemical resistance in the most aggressive environments. In addition, it allows the fan to operate without any speed to skip ranges when driven by VFD.

He received his Master in Aerospace Engineering from at Politecnico of Milan – Italy, in 2004. His studies were focused on structural analysis and turbo machines in general. Since 2005 he has been working in the technical department of Cofimco S.r.l., a leader in aluminium and fiberglass axial fans manufacturing. He is now Director of the Aftermarket Engineering division of the company and still involved in Research & Development of high performance axial fans.

CARLO GALLINA
Cofimco SRL

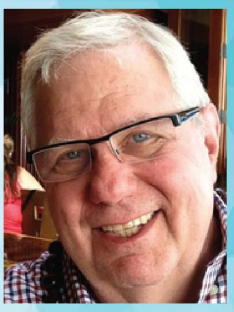
TP 23-06 - Maximum Soluble Inhibitor as a Point Diminishing Returns

1/30/23 - 10:00 AM...pg. 84

Many corrosion inhibitors are solubility limited and are frequently applied at dosages several times their maximum solubility in the water treated. Dosages above the maximum solubility may require an inhibitor to prevent fouling or scale formation when corrosion inhibitors such as phosphates and zinc are applied above their maximum solubility.

This paper documents the corrosion rate profiles balow and above maximum solubility of the inhibitors in the treated water, and recommends the use of the calculated maximum solubility to optimize corrosion control, minimize inhibitor dosage, and prevent overfeed. Use of these guidelines can extend supplies of raw materials in short supply.

Rob Ferguson is a pioneer in the computerization of cooling water chemistry and wrote much of the software in use today for cooling water evaluation, treatment modeling, control, and dosage optimization. Rob was educated at the US Naval Academy and University of Minnesota and was awarded a BS in biochemistry and microbiology in 1971. Rob co-founded French Creek Software in 1989.



ROB FERGUSON
French Creek Software

TP 23-07 - Carbon Footprint Influencing Factor Analysis of Polypropylene Fill Based on Literature Data

1/30/23 - 10:00 AM ...pg. 101

The Global Warming Potential or the Carbon Footprint is getting more and more into the focus of our daily lives. It is therefore important to understand the influencing factors on a specific product and what can be done to reduce the footprint. Based on literature data in this paper this kind of analysis is done for cooling tower fill made from Polypropylene.

Dr.-Ing. Nina Woicke is an expert in process engineering and has a PhD in polymer science from the University of Stuttgart, Germany. She has more than 20 year of experience in plastic engineering as well as 15 years of knowledge on the use of structured packings in various industrial applications like cooling towers.
Nina Woicke is an independent technical consultant for polymer product development. Since she is convinced that excellent education is of particular importance, she also works as a freelance lecturer. Her main goal is to help her customers to develop inspiring designs with efficient technologies and sustainable materials so that they can offer high-quality products in the future. In order to improve her services, she is currently training to become an environmental and climate manager.

DR. NINA WOICKE
Nina Woicke Engineering

TP 23-08 - See the Light: Recent Advances in Fluorescence Help Take Control of Your System's Chemistry

1/30/23 - 10:30 AM **...pg. 114**

RAYMOND POST
United Water Consultants

Monitoring and control of cooling water treatment chemistry has evolved considerably through the years. Wet chemical benchtop analysis of individual grab samples followed by manual adjustment of chemical metering pump output has been widely practiced since the 1960's and is still in use today. Many improvements to the manual process have evolved over the years including metering pumps with feedback capabilities, equipment that automates the sampling process and performs wet chemical analysis, and methods that involve the incorporation of fluorophores in the treatment chemistry. Fluorescence has advantages over wet chemistry in that fluorophores can be detected at much lower levels and can be measured with robust solid-state probes placed in the cooling water flow. Early fluorophore applications, although well received commercially, had limitations. Specifically, the fluorophore was initially applied only as an inactive tracer added to the finished product, and the sensing fluorometers struggled with accuracy in "dirty" waters. This paper will discuss the recent advances in fluorescence that make it a compelling method, including incorporating the fluorophore into key active ingredients and significant improvements to fluorometer design.

Mr. Post has more than 40 years of industrial water treatment experience, including the development, application, and evaluation of cooling water treatment programs. Prior to joining United Water Consultants in 2019, Mr. Post held several positions with ChemTreat, Betz Laboratories and GE Water including director of cooling technology, global technical leader for cooling water chemistry, power industry technical manager, senior technical consultant, and positions in product development, product management, and technical services. Mr. Post is a licensed professional engineer and a member of the Cooling Technology Institute and the National Society of Professional Engineers. Mr. Post earned a B.S.E in Chemical Engineering from Princeton University in 1976. He holds 3 US Patents and has authored more than 50 technical papers on industrial water treatment.

TP 23-09 - Design and Practical Consideration for Large Scale Asbestos Cement NDCT Refurbishments

1/30/23 - 10:30 AM ...pg. 126

OCKERT AUGUSTYN
Kelvion (Pty) Ltd.

Multiple large power stations in South Africa operate using natural draft wet cooling towers. Most of these cooling towers were built using asbestos cement fill and have reached their end of life. Poor makeup water quality at many of these plants has resulted in severe fill fouling which has led to significant reductions in cooling tower performance. In 2020, multiple projects were initiated to replace the asbestos cement fill of large natural draft wet cooling towers to improve its thermal performance. Fill selection was based on a study at one of the relevant power stations using actual cooling water with the purpose of identifying suitable fill products for specific operating conditions. The paper explores the design considerations of such a project from initiation to execution. Design considerations include the fill selection, new fill support platform, structural and mechanical characteristics of the fill, quality control of the plastic used in fill production, thermal performance, fixed geometric challenges, etc. In conclusion, recommendations for future fill replacement of this nature from a design contractor and end user viewpoint are provided.

Ockert has been involved in the energy, power, and oil & gas environments for 10 years as a mechanical design engineer and has worked with new build and running plant projects. As a design engineer at Kelvion, his responsibilities include the thermal and mechanical design of various types of heat exchangers as most projects require a custom design based on the service requirements. Previously, working for a large power utility he was involved in modification and maintenance projects on various power plant sites. He completed his B.Eng and MScEng at Stellenbosch University majoring in Fluid dynamics, heat transfer and turbomachinery.

TP 23-10 - Case Study: 95% Recovery of Cooling Tower Blowdown with Advance Reverse Unit

1/30/23 - 11:00 AM ...pg. 143

IDE developed a membrane-based technology, The MAXH2O DESALTER, that enables high recovery of CTBD. CTBD is characterized by high scaling potential arising from Silica, gypsum, hardness and alkalinity, and high bio-fouling potential resulting from the open nature of the cooling towers.

The MAXH2O DESALTER contains a single stage reverse osmosis system, with an integrated salt precipitation unit. This technology operates by recirculating the CTBD through RO system followed by a fluidized bed reactor in which controlled precipitation of supersaturated sparingly soluble salts is performed.

As a Team Leader, Tal leads pojects and R&D activities in the field of Industrial water treatment & reuse. The R&D activities include the development and execution of pilot operations, process development and new process technology evaluation. Engineering activities include process design, water chemistry modeling and participating in all aspects of project execution including commissioning and technical support in operations.

TAL FABIAN
IDE Water Technologies

TP 23-11 - Lightning Protection on Cooling Towers

1/30/23 - 11:00 AM ...pg. 150

The paper will begin with a discussion on lightning formation and propagation, four different types of lightning damage, and a three-part approach to controlling lightning damage including various types of structural lightning protection. It will be followed by a discussion of the particular challenges presented by cooling towers and specific methods of meeting them, including a regular, effective inspection and maintenance program. The paper will reference applicable lightning protection codes and standards, including National Fire Protection Association NFPA 780 and Underwriters Laboratories UL 96 and 96A. It will conclude with a suggestion that CTI petition NFPA for a special chapter in NFPA 780 referencing cooling towers to replace the CTI lightning protection document.

Bruce Kaiser, founder and Chief Executive Officer of Lightning Master Corporation, is a leading international authority on the prevention of lightning and static damage at industrial, commercial, military, and public facilities. Mr. Kaiser has authored numerous articles on static and lightning protection for domestic and international trade and professional publications and has spoken at many professional organization trade shows and seminars. He also holds multiple patents on various technologies relating to lightning and static protection. He serves as a principal member of the National Fire Protection Association NFPA 780, Committee on Lightning Protection & numerous other committees.

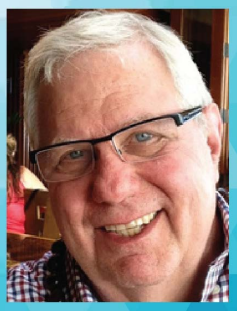
BRUCE KAISER
Lightning Master

TP 23-12 - Are We Treating Beakers or Systems? Laboratory Testing and Validation in a Field Context

1/30/23 - 11:30 AM ...pg. 167

Laboratory testing of water treatment programs for scale and corrosion control must represent field conditions and the operating context to which they are subjected. Failure to represent conditions in the wild in evalautions can rpodcue stellar results and performance in the laboratory, and abject failure when applied in the wild. This paper discusses ket elements of laboratory testing to obtian evaluations that correlate with field conditions, and results.

Rob Ferguson is a pioneer in the computerization of cooling water chemistry and wrote much of the software in use today for cooling water evaluation, treatment modeling, control, and dosage optimization. Rob was educated at the US Naval Academy and University of Minnesota and was awarded a BS in biochemistry and microbiology in 1971. Rob co-founded French Creek Software in 1989.



ROB FERGUSON
French Creek Software

TP 23-13 - Computer Vision Assisted Condition Assessment of Concrete Cooling Towers

1/30/23 - 11:30 AM ...pg 174

This paper presents a methodology to sense, detect, and quantify structural deterioration in concrete cooling towers using photographic images collected on-site and machine learning, more commonly known as artificial intelligence. By analyzing site photos, deterioration can be marked and quantified for review and decision-making by engineers. A review of photos from periodic inspections can also be utilized to track the progress of deterioration and provide recommendations for the frequency of maintenance and repair. With this information, an asset management plan can be developed with repair budgets and time frames for the implementation of repairs in a more prioritized manner. By combining site inspection and machine learning, the end goal is to provide more meaningful condition assessments and customized recommendations for a future course of action for periodic maintenance and repair.

MARK WILLIAMS
Water P. Moore & Associates

TP 23-14 - Coagulant-Polymer 101: Fundamentals of Sedimentation and Dewatering...pg. 188

1/31/23 - 8:00 AM

As a way of maintaining the zero liquid discharge policy at cooling water treatment, polymeric flocculants have been used along with other chemicals in reactor-type clarifier. A properly designed polymer feed system is the key to achieving superior performance and cost-effective solid-liquid separation. This presentation illustrates how to prepare more efficient polymer solutions based on the knowledge of fluid dynamics and polymer chemistry.

Dr. Yong Kim's technical interest includes fluid mixing and turbulence, surface chemistry, solid-liquid separation, and water/wastewater disinfection. Previously employed by USFilter and Siemens Water Technologies, he is an active member of the Solids Separation Subcommittee of WEF/RBC. As a Ph.D. chemical engineer, he has authored a book entitled "Coagulants and Flocculants: Theory and Practice." He published over 40 technical papers with seven (7) US patents issued to his credit.

DR. YONG KIM
USGI Solutions, Inc.

TP 23-15 - Lab Evaluation of Fill Component Flammability

1/30/23 - 2:00 PM ... pg. 197

This paper explores the plausibility of a small-scale, cost-effective test method for cooling tower fill media. The work further investigates the test method presented in CTI TP17-15, Novel Methods for Characterizing Ignitability of Cooling Tower Polymer Fill Products, simulating "hot work" above the fill media via a heated metal plate. Several variables are evaluated and presented in the pursuit of a component level flammability classification.

Dylen Ziegler joined Brentwood Industries as an Application Engineer for the Cooling Tower Division in 2020. Based in Reading, PA; he provides domestic and international technical support to customers, Brentwood's sales, and project planning teams as well as supporting the onsite research and development laboratory. Dylen is a 2018 graduate from Pennsylvania State University with a Bachelor of Science in Mechanical Engineering.

DYLEN ZIEGLER
Brentwood Industries

TP 23-16 - A Comparison of a New Maleic Terpolymer (MTP A) with Current Maleic Terpolymers for Use in Cooling Towers

1/31/23 - 8:30 AM... pg. 211

DR. SURESH PATEL
CREST Water Pte. Ltd.

Currently, there are several maleic terpolymers that are used in cooling water formulations to control calcium carbonate and corrosion control with zinc. A laboratory study has been carried out on a new maleic terpolymer, MTP A, and compared with currently available maleic terpolymers in tests for calcium carbonate, calcium sulfate, calcium phosphate, silt, iron for scale control and formulated with zinc for corrosion control. These performance tests show that not only it matches the performance of current maleic terpolymers for calcium carbonate and corrosion control but has improved the dispersion properties of silt and iron oxide. Furthermore, this new MTP A has better calcium sulfate and calcium phosphate control with high tolerance to calcium and chlorine therefore can be used in high-hardness waters and in the presence of a halogen-based oxidizing biocide. This new MTP A will allow water treaters to develop more robust formulations to address more severe waters that are being used in cooling towers.

Dr. Suresh Patel is a Surface and Physical Chemist by training and has more than 30 years of management experience in the water industry. Notably, he has also worked in Desalination and Cooling Water for more than 25 years in positions in R&D and is responsible for new chemistries for scale, corrosion, and microbiological control agents. He has published over 30 papers in the area of water treatment and is currently the vice president of Technology.

TP 23-17 - Improved Bulk Air Cooler (BAC) Performance Modeling Using Hot and Cold Water Experimental Data

1/30/23 - 2:30 PM ...pg. 231

REITUMETSE MOKOENA
Kelvion (Pty) Ltd.

Direct contact cooling towers are used in various applications where the transfer of heat and mass between water and air is needed. Bulk air coolers (BAC) are direct contact devices that are extensively used in the deep-level mining industry to cool and dehumidify the air, using chilled water, before entering the mine shaft. They operate mechanically in a similar manner to cooling towers, with conventional cooling tower theory typically being used for design and modeling purposes. Various models of varying complexity have been developed to predict the performance of cooling towers using experimentally determined mass transfer coefficient data. These methods accurately predict cooling tower outlet water temperatures if the calculations are done over a range of water temperatures corresponding to that used to measure the experimentally determined mass transfer coefficient data. It has been found that these methods fail to predict the performance of bulk air coolers accurately if experimentally determined mass transfer coefficient data obtained from cooling tower testing is used. This paper proposes a method to improve the accuracy of performance modeling of bulk air coolers, operating at water temperatures much lower than conventional cooling towers. In addition to providing a theoretical basis, experimental data is used to validate the proposed method.

Reitumetse Mokoena received her BEng (Honours) in Mechanical Engineering from the University of Pretoria. She is an intern at Kelvion Service (Pty) Ltd since February 2022. Her day-to-day projects involve design-related activities for large industrial heat exchangers, including air coolers, shell-and-tube heat exchangers, and recently a large cooling tower refurbishment which includes the replacement of asbestos cement with modular trickle fill at a large South African utility.

TP 23-21 - Sizing of Plume Abatement Coils - Part 2

1/31/23 - 8:00 AM **...pg. 266**

Plume abatement coils are used to reduce/prevent visible plumes of moisture exiting a wet cooling tower fan stack. Typically, this is done by mixing in dry, heated ambient air with the moist air stream exiting the drift eliminators. The cold ambient air passes over the “airside” of the coil and is heated by transferring heat from a hot fluid source flowing on the “tube side” of the coil. The paper is a follow on to the paper presented in 2022 and will present the methodology and equations required to calculate the tube side and air side pressure drop of a thermally sized coil.

Bob is SHECO Industries CEO and has over 30 years’ experience in the management, sale, design, and manufacturing of heat exchanger equipment. Bob holds a Masters and Bachelors of Mechanical Engineering from Drexel University and is the author/co-author of multiple technical papers and US Patents.

BOB GIAMMARUTI
SHECO Industries

TP 23-23 - Drop Hunter Iso Probe Development, Measurement, and Verification

1/31/23 - 8:30 AM **...pg. 287**

The paper focuses on an overview of both currently and historically used methods for measuring the effectivity of drift eliminators (or total drift) with regard to their accuracy achieved and any difficulties that the methods have to weigh. The paper also includes an introductory evaluation of a newly proposed thermal-based method for non-accredited orientation measurements of drift for in-field measurements on real cooling towers.

Ing. Jan Cizek Ph.D. worked for several years as an Assistant Professor at the Czech Technical University in Prague. He finished his Ph.D. in 2010 with a thesis focused on a novel method for DE measurement, after that he has been working as a leader of a cooling tower team at the CTU for more than 7 years. In 2017 he established his own company 4Jtech Ltd. where he works as Executive director up to now. 4Jtech Ltd. is specialized in the development of modern testing methods mainly for automotive engineering, but recently also for cooling tower industry.

DR. JAN CIZEK
4JTech Ltd.

TP 23-25 - Impact Energy from Hail: Considerations for Cooling Tower Media

1/31/23 - 9:00 AM ...N/A

The service life of cooling tower products that are exposed to external conditions may be strongly dependent on the decrease in impact resistance since it may be exposed to high impacts from storms and wind-blown objects. This paper will present how the impact energy of hail can be estimated and compares this to the impact resistance of commonly used materials. The comparison can be used as guidance for the selection of materials and product thicknesses for cooling tower components such as drift eliminators and inlet louvers in areas prone to severe weather events.

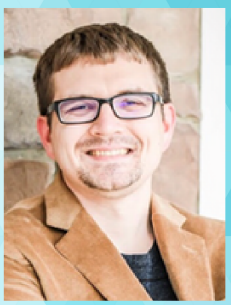
JASON ZERBE
Brentwood Industries

Jason joined Brentwood Industries in 2020 as Sr. Manager of Applications Engineering. Based in Reading, PA; he has responsibility for global technical support and manages the onsite R&D laboratory. Jason was previously employed in the industrial battery industry for 20 years. During this time he held various technical roles in research & development, lab management, product engineering, and application engineering. Most recently before joining Brentwood, Jason was a Senior Manager at EnerSys and led their Technical Marketing Group for batteries and charging technologies. Jason is a graduate of Lycoming College in Williamsport, PA with a B.A. in Physics.

TP 23-27 - Condensation Modeling of Plume from a Mechanical Draft Cooling Tower

1/31/23 - 9:30 AM ...pg. 301

The mechanical draft wet cooling tower is the most commonly adopted heat dissipation system in the air conditioning and energy industries. It is employed everywhere where heat needs to be dissipated in an efficient and compact way. The main drawback is the plume exiting at the top of the stack that contains moisture. When the plume mixes with the ambient atmosphere that is at a lower temperature, the plumes moisture content condensates and lowers traffic visibility and/or causes air pollutant concentration. Special attention is needed for the condensation of the saturated air exhausting out of the tower. Complex ambient conditions influence the aerodynamic behavior of plumes along with topography, such as nearby buildings and it is difficult to predict plume condensation behavior either experimentally or analytically. A computational fluid dynamic model is developed for condensation of water vapor from a mechanical draft wet cooling tower. This study applies realistic operating conditions, comprised of speed, wind direction, ambient air relative humidity, and air volume flow rate coming out of a tower. The effects of Plume interactions with nearby buildings are parametrically investigated for the operating conditions using a newly proposed condensation model. It is found that the condensation behavior predicted by the computational fluid dynamic simulation with the developed model is reasonably interpreted with other thermohydraulic parameters.



DR. CHRISTOPHER SOBECKI
Savannah River National Laboratory

Dr. Sobecki is currently a Post Doctoral Fellow at SRNL researching water cooling tower plume dynamics. Prior to joining SRNL in 2021, Dr. Sobecki earned his Ph.D. in mechanical engineering at Missouri University of Science and Technology. His research topics included the dynamics of paramagnetic and ferromagnetic particles in shear flows and under uniform magnetic fields (both in two- and three-dimensions), particle transportation in a curved channel, and the dynamics of spherical magnetic Janus particles in shear flows and under uniform magnetic fields. He also designed microfluidic devices to fabricate silver layers on DNA origami with the university's chemistry department. Additionally, as a year-round intern with Sandia National Laboratories, he developed numerical models on the thermodynamic properties of water molecules during a liquid-vapor phase change. He has received numerous awards including the Chancellor Distinguished Fellowship and the Koerner Family Foundation Stipend as well as mentored three undergraduate students in fabricating disc particles, ellipsoidal particles, and Helmholtz coils.

TP 23-29 - Traveling Water Screens to Improve Cooling Tower Efficiency

1/31/23 - 10:00 AM ...pg. 309

Many field-erected evaporative "wet" cooling towers are highly susceptible to poor performance due to obstruction problems associated with debris passing by traditional stationary water screens during the cleaning process. Traveling water screen systems used in place of stationary water screens give plants the ability to more efficiently and safely remove cooling tower debris, often saving the operation hundreds of thousands of dollars in lost production and maintenance costs.

Jon Southworth is the Business Development Manager for Cambridge Water Screen Systems (a Regal Rexnord brand) and oversees U.S. and international sales and marketing for the water screen system market. A former United States Army officer, he has over 30 years of experience in the industrial, waste management, recycling, and software industries.

JON SOUTHWORTH
Regal Rexnord

TP 23-18 - Overstabilization of Stabilized Bromine: Should this be a Significant Concern?

1/31/23 - 9:00 AM ...pg. 245

The buildup of stabilizers in a cooling tower over time and the possibility of diminished biocidal efficacy is a concern, especially in cooling towers with high cycles of concentration. There is certainly some precedent for this concern as chlorine in swimming pools can be over-stabilized by cyanuric acid. It has been speculated that having a certain level of stabilizer in a cooling tower would indicate the biocide is over-stabilized. However, we are unaware of any studies examining overstabilization in any detail. In this paper, efficacy studies were done as a function of sulfamate levels to determine the effect on both planktonic organisms and biofilms. Lastly, samples were taken from cooling towers treated with stabilized bromine so the measured sulfamate levels could be compared to the biocidal performance.

Bob is SHECO Industries CEO and has over 30 years of experience in the management, sale, design, and manufacturing of heat exchanger equipment. Bob holds a Masters and Bachelor of Mechanical Engineering from Drexel University and is the author/co-author of multiple technical papers and US Patents.

ERIC LIIMATTA
Albemarle Corporation

TP 23-20 - Softening Water with Ion Exchange Resins

1/31/23 - 9:30 AM ...pg. 255

This presentation will cover the softener basics, including water softener theory, which will cover ion exchange softening, the definition of commonly used terms, mathematical relationships, properties of the resin, capacity and leakage, process design, regeneration, resin fouling, chemical deterioration and other causes of oxidation, resin cleaning, and resin testing.

Stephen Wheeler is the Senior Ion Exchange Technologist at ResinTech, a US manufacturer of ion exchange products based in Camden, New Jersey. He received his bachelor's degree from Penn State in Environmental Resource Management.

STEPHEN WHEELER
ResinTech, Inc.

TP 23-22 - Advance Performance Monitoring Stream Surface Condensers

1/31/23 - 10:00 AM **...pg. 275**

Steam surface condensers are a critical component for power generation plants. Their performance directly impacts generating capacity, and heat rate and ultimately influences the bottom line. Inefficient operation of condensers can lead to lost power production, increased fuel costs, increased carbon dioxide emissions, and reduced profit margins. Continuous data collection and leveraging advanced cloud-based analytics empower plant operators to accurately evaluate the performance of their steam surface condenser and be more responsive. Additionally, it enables the operator to validate the efficacy of chemical treatment programs, optimize cooling tower performance, forecast the need to schedule maintenance of critical heat transfer equipment, and make critical decisions to improve fuel and water consumption while lowering greenhouse gas emissions.

ERIC ZUBOVIC
Veolia

Eric Zubovic is a Senior Product Applications Engineer for the global cooling group with Veolia Water Technologies & Solutions. He has a Master's education in Chemical Engineering and Business Administration. As well as a dual Bachelor's Degree in Chemistry and Mathematics. Eric has spent the majority of his 25-year water treatment career working in the field. Eric has co-authored several technical papers for professional organizations such as TAPPI, AISE, Eastern States Coke and Blast Furnace Society, Clearwater Clean Coal Conference, the International Water Conference, and AICHe.