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	<p>HEALTH in BUILDINGS HYGEIA 2026 <i>where the medical & engineering professions collaborate & innovate</i></p>	
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May 27-29, 2026 - Island of KOS, Greece

#	Wei Sun, P.E., FASHRAE	
Title:	Engsysco LLC, Ann Arbor, Michigan, USA	
email:	wsun@engsysco.com	•
Presentation title:	Multi-layer Auto-tuning System for Cleanroom Airflow Control Based on Distributed Particle Sensors	
<p>Cleanrooms are essential for industries like semiconductor manufacturing, pharmaceuticals, and healthcare, but they consume enormous amounts of energy—often 10 to 50 times more than ordinary office spaces. Traditionally, cleanrooms run their fans at full speed year-round, regardless of whether the room is occupied or how many particles are actually present. This “constant flow” approach wastes significant energy.</p> <p>This seminar paper presents a practical, multi-layer auto-tuning system that cuts energy use while strictly maintaining the required air cleanliness class. The core idea is: instead of blindly supplying a fixed air change rate, the system continuously monitors real-time particle concentrations using distributed laser sensors. When the room is unoccupied (nights, weekends, holidays—which can account for over 70% of total hours), the system automatically reduces fan speed and airflow. As soon as activity resumes or particle levels rise, it intelligently ramps back up to maintain cleanliness.</p> <p>The multi-layer architecture breaks the control task into manageable levels: fast local responses for sudden particle events, and slower global optimization for energy savings. This avoids the instability of overly aggressive controls. Practical options range from basic time-scheduled fan reduction to advanced demand-based control using manifold particle sensing and variable frequency drives. Real-world lab tests show that such strategies can reduce fan energy by 40-60% without ever compromising the cleanroom's ISO class.</p> <p>For facility managers and sustainability professionals, this approach offers a proven path to lower carbon footprint and operating costs—without requiring a complete rebuild of existing HVAC systems. The paper also discusses how newly revised ISO 14644 standards now explicitly support such energy-efficient, demand-based control methods.</p>		
Short CV:		
<p>Mr. Wei Sun is an ASHRAE Fellow and a Distinguished Lecturer, he served as a Director-at-Large in 2022–25, and past Chair of Environmental Health Committee (EHC), and the Chapter Technology Transfer Committee (CTTC). He is also a past President of the Detroit Chapter. He also served as the President of Institute of Environmental Sciences and Technology (IEST) in 2015.</p>		

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CV:

Wei Sun, P.E., FASHRAE, is a consulting engineer with over 28 years of experience in HVAC systems design. He holds a Master's degree from the University of Kentucky. Within ASHRAE, he serves as a Board Member and Director-at-Large (2022–25), Fellow, Distinguished Lecturer (since 2009), and past Chair of TC9.11 (Clean Spaces), the Environmental Health Committee (EHC), and the Chapter Technology Transfer Committee (CTTC). He is also a past President of the Detroit Chapter. Beyond ASHRAE, he served as President of IEST (Institute of Environmental Sciences and Technology) in 2015 and has been the USA Delegate for ISO/TC 209 cleanroom standards since 2012. He chairs NEBB's Cleanroom Performance Testing (CPT) Standard Committee in 2018-2025.

Mr. Sun is the Principal Author of the ASHRAE Design Guide for Cleanrooms (2017) and Cleanroom Contamination Prevention & Control (2021). He has authored over 50 technical articles in ASHRAE Transactions, ASHRAE Journal, and IEST Journal, and has been Principal Investigator for 12 U.S. government and ASHRAE research projects, with outcomes incorporated into ISO 14644 standards and IEST Recommended Practices. His research and publications of room pressurization, airborne contamination control, energy conservation, control automation in cleanrooms has been widely referenced. He received ASHRAE's Dan Mills Award (2006), Distinguished Service Award (2019), Exceptional Service Award (2019), and the Engineering Society of Detroit's Gold Award (2022).