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Dr. Pallin has worked in the building industry since 2005, and spent several years conducting research in Europe. He holds a master's degree in Structural Engineering, and a PhD in Building Technology from Chalmers University, Sweden. In 2013, he joined the Building Envelope Systems Research team at Oak Ridge National Laboratory (ORNL). Dr. Pallin is an expert on everything that involves the thermal and moisture durability performance of the building envelope. He has conducted research on probabilistic risk assessment applied to building performance and works with both existing and developing new simulation tools to estimate hygrothermal (heat and moisture) performance of building components, such as walls and roofs. Thanks to his profound knowledge in heat, air and moisture transfer in buildings, Dr. Pallin has developed methods and metrics to assess the overall thermal performance of buildings. He is currently the technical lead for the Commercial Building Integration team at ORNL, for which he responsible for the DOE BTO Building Envelope Campaign, which was launched in the summer of 2020. Dr. Pallin is also greatly involved in Residential Building Integration research under the DOE Building America program. Here, he is responsible for the development of the Building Science Advisor (BSA); an online tool to guide the industry to design durable and energy efficient wall assemblies.

Education:

- B.Sc. in Civil Engineering, Chalmers University of Technology, Sweden; 2007
- M.Sc. in Structural Engineering, Chalmers University of Technology, Sweden; 2009
- LicEng. in Building Technology, Chalmers University of Technology, Sweden; 2012
- PhD in Building Technology, Chalmers University of Technology, Sweden; 2013

Research:

- Probabilistic risk analyses of heat, air and moisture transfer through and inside of the building envelope. In general, risk coupled to changes in indoor air movements, energy performances and moisture durability in new constructions and retrofits for residential and commercial buildings.
- Principal Investigator of the Building Science Advisor (bsa.ornl.gov).
- Developing transient hygrothermal (heat and moisture) simulation models.
- Laboratory testing of full-scale wall system using heat, air and moisture simulation chambers.
- Designs of risk assessment algorithms.
- Developing a probabilistic simulation tool to predict human and appliance induced sensible and latent heat generation in residential buildings – The GIHM tool (Generation of Indoor Heat and Moisture).
- Developed overall building performance metric based on building characteristics, indoor and outdoor climate conditions, and user behavior – The BEP (Building Envelope Performance) metric.

Professional Affiliations:

- Voting Member - ANSI/ASHRAE/IES Standard 90.2-2018, Energy-Efficient Design of Low-Rise Residential Buildings
- Member of ASHRAE Pandemic Task Force - Residences
- Handbook Chair, Voting Member - ASHRAE TC 1.12, Moisture Management in Buildings
- Voting Member - ASHRAE SSPC 160, Criteria for Moisture-Control Design Analysis in Buildings
- Corresponding Member - ASHRAE TC 4.4, Building Materials and Building Envelope Performance
- Member - Association of Energy Engineers (AEE); October 2014 – present
- Principles Track Chair: International Conference on Thermal Performance of the Exterior Envelopes of Whole Buildings (Buildings XV); December 2022
- Principles Track Chair: International Conference on Thermal Performance of the Exterior Envelopes of Whole Buildings (Buildings XIV); December 2019
- Workshop Chair: International Conference on Thermal Performance of the Exterior Envelopes of Whole Buildings (Buildings XIII); December 2016
- IEA-ECBCS/Annex 55, Member: Reliability of Energy Efficient Building Retrofitting – Probability Assessment of Performance and Cost

Mentorship:

- Science Undergraduate Laboratory Internships (SULI) Program,
    - Amy Albaugh (University of Tennessee)
    - Meghan Perez (John Hopkins University)
    - Johnson Luma (University of Tennessee)
    - Michaela Stockdale (Tennessee Tech)
    - Elizabeth Buechler (Tufts University)
    - Jared Carpenter (University of Tennessee)
    - Sabrina Carrol (University of South Carolina)
    - Brayden Roque (University of Central Florida)
    - Rachel Bandy (University of Minnesota)
    - Anna Danek (Georgia Tech)
    - Lynee Turek-Hankins (Stanford)
- Advanced Short-Term Research Opportunity (ASTRO) Program.
    - Nicklas Karlsson (Chalmers University of Technology)
    - Amanda Ahl (KTH Royal Institute of Technology)
    - Florian Antretter (Fraunhofer IBP)
    - Jalaycia Hughes (Florida Agricultural & Mechanical University)
    - Tyler Pilet (Georgia Tech)
- DOE/ORNL Community College Internship (CCI).
    - Gisele Baaklini (Pellissippi State Community College)
    - Allison Warren (Pellissippi State Community College)

ORNL Invention Disclosures:

- 201303199 for “Infrared 3D Imaging of Operational Buildings or Building Elements;” 2013
- 201403242 for “Reliable and Durable Design of Commercial Flat Roofs;” 2014
- 201603674 for “Self-rotating Energy Recovery Ventilation Wheel;” 2016
- 201703997 for “Generation of Indoor Heat and Moisture (GIHM) Software Tool;” 2017
- 201703981 for “Grout-Free Full Wall Assembly Block;” 2017
- 201904380 for “RetroFIT - Panelized wall retrofit system;" 2019

Awards:

- Scholarship: Ernst M Frimans Scholarship Fund; 2010
- Scholarship: Chalmerska Scholarships Fund; 2011
- Fellowship: The Sweden America Foundation, Kami Research Foundation; 2012
- Honorary Fellow: The American-Scandinavian Foundation; 2012
- Scholarship: The Adlerbertska Research Foundation; 2012
- Scholarship: Thesis Scholarship from The Swedish Union of Tenants; 2013
- R&D 100 Finalist – The Building Science Advisor; 2019

Entrepreneurship:

- Founder of Atletica Fitness Center, Varberg, Sweden; 2001
- Founder of Budo Fitness Varberg, Varberg, Sweden; 2005
- Founder of Pallin Arkitektur & Konstruktion, Varberg, Sweden; 2005

Publications:

Reviewed International Journal, Conference Papers and Books:

- Pallin, S. (2010). Potential risks when combining experienced retrofitting measures with newly developed techniques. Paper presented at the Proceedings of the 1st Central European Symposium on Building Physics., Krakow, Poland.
- Johansson, P., Pallin, S., & Shahriari, M. (2011). Development of a Risk Assessment Procedure Applied on Building Physics: Part One; Model Development. Paper presented at the 12th International Conference on Building Materials and Components Porto, Portugal.
- Pallin, S., Johansson, P., & Shahriari, M. (2011). Development of a Risk Assessment Procedure Applied on Building Physics: Part Two; an Applicability Study. Paper presented at the 12th International Conference on Building Materials and Components Porto, Portugal.
- Pallin, S., Johansson, P., & Hagentoft, C.-E. (2011). Stochastic modeling of moisture supply in dwellings based on moisture production and moisture buffering capacity. Paper presented at the IBPSA - Building simulation 2011, Sydney, Australia
- Pallin, S., & Kehrer, M. (2012). Hygrothermal Simulations of Foundations: Part 1 - Soil Material Properties. Journal of Building Physics, published online 13 December 2012.
- Pallin, S., & Kehrer, M. (2013). Condensation Risk of Mechanically Attached Roof Systems in Cold Climate Zones. Paper presented at the RCI 28th International Convention & Trade Show March 14-19, 2013, Orlando, Florida.

- Kehrer, M., & Pallin, S. (2013). Hygrothermal Material Properties for Soils in Building Science. Journal of the National Institute of Building Sciences – October 2013.
- Pallin, S., & Kehrer, M. (2013). A Hygrothermal Probabilistic Risk Analysis Applied on Residential Unvented Attics. Paper presented at the Thermal Performance of Exterior Envelopes of Whole Buildings XII International Conference, Clearwater, Florida.
- Kehrer, M., & Pallin, S. (2013). Hygrothermal Material Properties for Soils in Building Science. Paper presented at the Thermal Performance of Exterior Envelopes of Whole Buildings XII International Conference, Clearwater, Florida.
- Desjarlais, A., Hardy Pierce, H., Woodring, W. and Pallin, S. (2014). Practical Application of Hygrothermal modeling of West Coast Wood Deck Systems. The Journal of RCI - Interface XXXII(3): 8.
- Pallin, S. & Kehrer, M. (2014) Risk Of Condensation In Mechanically Attached Roof Systems In Cold U.S. Climate Zones. Drying and Wetting of Building Materials and Components, Chapter 9, ISBN 978-3-319-04530-6, Building Pathology and Rehabilitation Volume 4, Springer International Publishing Switzerland, 2014.
- Pallin, S. and Sasic Kalagasidis, A. (2014). Hygrothermal Risk Assessment - Retrofit of External Wall by the Application of Interior Insulation. 10th Nordic Symposium on Building Physics, June 15th to 19th 2014, Lund, Sweden.
- Pallin, S. and Kehrer, M. (2014). Causes of Condensation in Mechanically Attached Cool Roof Systems. 10th Nordic Symposium on Building Physics, June 15th to 19th 2014, Lund, Sweden.
- Pallin, S., Kehrer, M. and Desjarlais, A. (2014). Energy Penalty Associated with the Use of Mechanically Attached Roofing System. RCI - 2014 Symposium on Building Envelope Technology. Tampa, Florida.
- Pallin, S. and Hun, D. (2015). How to evaluate moisture durability issues due to air leakages in highly insulated walls. RCI - 2015 Symposium on Building Envelope Technology. Nashville, Tennessee.
- Boudreaux, P., Pallin, S. and Jackson, R. (2016). Investigation of the proposed solar-driven moisture phenomenon in asphalt shingle roofs. Journal of Building Physics January 19, 2016.
- Pallin, S., Boudreaux, P., Joeng Jo, S., Perez, M. and Albaugh, A. (2016). Simulations of Indoor Moisture Generation in U.S. Homes Symposium on Advances in Hygrothermal Performance of Building Envelopes: Materials, Systems and Simulations. Renaissance Orlando at SeaWorld, FL, ASTM International.
- Pallin, S., Boudreaux, P. and Gehl, A. (2016). Air Tightness of Common Wall Assemblies and its Effect on R-Value. Symposium on Advances in Hygrothermal Performance of Building Envelopes: Materials, Systems and Simulations. Renaissance Orlando at SeaWorld, FL, ASTM International.
- Pallin, S., Hun, D. and Boudreaux, P. (2016). Simulating air leakage in walls and roofs using indoor and outdoor boundary conditions. Thermal Performance of the Exterior Envelopes of Whole Buildings XIII International Conference. Clearwater, FL.
- Boudreaux, P., Pallin, S., Hun, D., Kehrer, M., Jackson, R. and Desjarlais, A. (2016). Protocol to Evaluate the Moisture Durability of Energy-Efficient Walls. Thermal

Performance of the Exterior Envelopes of Whole Buildings XIII International Conference. Clearwater, FL.

- Miller, W. A., Boudreaux, P., Pallin, S., Biswas, K., Gehl, A., Atchley, J., Karlsson, N., Bednar, D. and Jackson, R. (2016). "A Field Study Setup of Four Homes having Non-Ventilated and Semi-Conditioned Sealed Attics." Journal of Green Building.
- Buechler, E., Pallin, S., Boudreaux, P. and Stockdale, M. (2017). "Probabilistic modeling of the indoor climates of residential buildings using EnergyPlus." Journal of Building Physics.
- Stockdale, M., Pallin, S., Boudreaux, P. and Buechler, E. (2017). Effects of air leakage on R-values and energy loss based on U.S. climate zone. 2017 ASHRAE Annual Conference. Long beach, CA.
- Boudreaux, P., Pallin, S., Accawi, G., Jackson, R., Desjarlais, A., and Senecal, D. (2018). "A rule-based expert system applied to moisture durability of building envelopes" Journal of Building Physics.
- Hun, D., Bhandari, M., Lapsa, M., Shrestha, S., & Pallin, S. (2018). Airtightness of Commercial Building Envelopes: Where are we and where could we go? Paper presented at the 2018 Summer Study on Energy Efficiency in Buildings, Pacific Grove, CA.
- Bhandari, M., Hun, D., Pallin, S., Shrestha, S., & Lapsa, M. (2018). A Simplified Methodology of Energy Savings Estimations in Commercial Buildings from Improvements in Airtightness. Journal of Energies.
- Pallin, S., Pilet, T., Warren, A., Bhandari, M., Lapsa, M., & Hazard, C. (2018). Quantifying Hidden Value with Enclosure Performance Metric. Paper presented at the RCI, Inc. – 2018 Building Envelope Technology Symposium, Nashville, TN.
- Boudreaux, P., Munk, J., & Pallin, S. (2018). Estimating the generation of indoor heat and moisture – Part 1: Probabilistically determining U.S. household characteristics and occupant behavior. Journal of building Performance Simulation.
- Antretter, F., & Pallin, S. (2019). HAMT extension for EnergyPlus encompasses moisture sources due to air leakage. Paper presented at the 2019 ASHRAE Winter Conference & AHR Expo, Atlanta, GA.
- Antretter, F., & Pallin, S. (2019). Modelling moisture sources due to air leakage with the HAMT extension for EnergyPlus. Paper presented at the 2019 ASHRAE Annual Conference, Kansas City, MO.
- Hagentoft, C.-E., & Pallin, S. (2020). Thermal Step Response of N-Layer Composite Walls - Accurate Approximative Formulas. Journal of Heat Transfer, 142(3). doi:10.1115/1.4045642
- Pallin, S., Turek-Hankins, L., & Pilet, T. (2020). Quantifying Thermal Performance of the Building Envelope - Beyond Common Practice. Paper presented at the XV DBMC - 15th International Conference on Durability of Building Materials and Components, Barcelona, SPAIN.
- Hughes, J., & Pallin, S. (2020). A Framework for Building Performance Analysis: Investment Return Approach for Energy Savings on Building Product Installation. Paper

presented at the XV DBMC - 15th International Conference on Durability of Building Materials and Components, Barcelona, SPAIN.

- Pilet, T., Pallin, S., Turket-Hankins, L., and Rakha, T. Assessing Envelope Thermal Performance with a Whole-Building Conductance Time-Series Profile. Paper submitted to Journal of Building Performance Simulation Pub ID: 139665.
- Hagentoft, C.-E., & Pallin, S. (2020). A Conceptual Model for How to Design for Building Envelope Characteristics. Impact of thermal comfort intervals and thermal mass on commercial buildings in U.S. climates Journal of Building Engineering, Submitted on June 29th, 2020.

Other Papers and Reports:

- Pallin, S. (2008). Airtightness in dwellings with clay hollow masonry blocks - Determination of infiltration rates and air leakages with buildings made of Porotherm masonry blocks. Master thesis, Chalmers University of Technology, Gothenburg.
- Johansson, P., Pallin, S., & Shahriari, M. (2010). Risk Assessment Model Applied on Building Physics: Statistical Data Acquisition and Stochastic Modeling of Indoor Moisture Supply in Swedish Multi-family Dwellings. Report. IEA Annex 55 RAP-RETRO, Copenhagen meeting, October 25-27. Copenhagen, Denmark.
- Pallin, S. (2011). Evaluation of Framework for Probabilistic Assessment - External Wall Retrofit with Interior Additional Insulation. IEA Annex 55 RAP-RETRO, San Antonio meeting, October 24-26.
- Stein J., Hagentoft C-E., et al. (2011). Energieffektivisering – Vilka risker finns och hur ska de hanteras, Bygg&Teknik, 2/2011.
- Pallin, S. (2012). Probabilistic Risk Assessment of Energy Efficient Retrofitting Techniques - Focus on Multi-family Dwellings and the Effects of Changing Air Movements. Thesis for the degree of licentiate, Chalmers University of Technology, Gothenburg.
- Pallin, S., & Kehrer, M. (2012). Hygrothermal Simulation of Foundations: Part 1, Soil Material Properties (pp. 24). ORNL/TM-2012/289. Oak Ridge National Laboratory, TN: Building Technologies Research and Integration Center - Energy and Transportation Science Division.
- Pallin, S., Wahlgren, P., & Hagentoft, C.-E. (2012). Rapport - Byggnadsfysikalisk undersökning av modulyttervägg, Utredning för BoxModul AB. Chalmers University of Technology, Building Technology.
- Pallin, S. (2013). Riskbedömning vid renoveringsåtgärder av bostäder. Bygg&Teknik, 2/2013.
- Pallin, S. (2013). Risk Assessment of Hygrothermal Performance – Building Envelope Retrofit. Thesis for the degree of doctor of philosophy, Chalmers University of Technology, Gothenburg.
- Pallin, S., Kehrer, M. & Desjarlais, A. (2013). Hygrothermal Performance of West Coast Wood Deck Roofing System. ORNL/TM-2013/551. Oak Ridge National Laboratory, TN: Building Technologies Research and Integration Center - Energy and Transportation Science Division.

- Boudreaux, P., Pallin, S., & Jackson, R. (2013). Moisture performance of sealed attics in the mixed-humid climate. ORNL/TM-2013/525. Oak Ridge National Laboratory, TN: Building Technologies Research and Integration Center - Energy and Transportation Science Division.
- Pallin, S., Boudreaux, P. and Jackson, R. (2014). Indoor climate and moisture durability performances of houses with unvented attic roof constructions in a mixed-humid climate, Report ORNL/TM-2014/549, Building Technologies Research and Integration Center - Energy and Transportation Science Division, Oak Ridge National Laboratory, TN, USA.
- Pallin, S., Hun, D. and Jackson, R. (2014). Risk Assessment of Energy-Efficient Walls, Report ORNL/TM-2014/676, Building Technologies Research and Integration Center - Energy and Transportation Science Division, Oak Ridge National Laboratory, TN, USA.
- Pallin, S., Boudreaux, P., Kehrer, M., Hun, D., Jackson, R. and Desjarlais, A. (2015). Moisture Durability Assessment of Selected Well-insulated Wall Assemblies. Oak Ridge National Laboratory, Energy and Transportation Science Division.
- Miller, W. A., Boudreaux, P., Pallin, S., Biswas, K., Gehl, A., Atchley, J., Karlsson, N., Bednar, D. and Jackson, R. (2016). Field Study and Analytical Assessment of Sealed Attics Conducted for the State of Florida. Oak Ridge National Laboratory, Energy & Transportation Science Division.
- Pallin, S., Boudreaux, P., Shrestha, S., New, J., Adams, M. (2017). State-of-the-Art for Hygrothermal Simulation Tools, Report ORNL/TM-2017/92. Building Technologies Research and Integration Center - Energy and Transportation Science Division, Oak Ridge National Laboratory, TN, USA.