

Hierarchical Generalized Linear Models: Application to Yield Modeling

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Abstract: In this talk, a hierarchical modeling approach to model semiconductor end-of-line yield based on measurements collected in the manufacturing process is presented. Semiconductor manufacturing is well-known for its complexity and the enormous amounts of data generated during the manufacturing process. Combining these with a complicated sampling strategy within each process, a one-stage model can be very difficult. By introducing intermediate variables, a two-stage modeling technique can facilitate the analysis of this problem. The first stage modeling is called “meta-modeling”, which is used to identify the key intermediate variables critical to the yield. The second stage modeling is called “sub-process modeling”, which is used to establish the relationship between intermediate variables and their key sub-processes. This approach allows us to analyze the relationship between intermediate variables and all key sub-processes independently, and then combine all effects to predict wafer yield by some of these key sub-processes. Generalized linear models are used for sub-process and meta-modeling due to their ability to tackle categorical and integer responses. This research uses hierarchical modeling to predict yield by using Poisson and multinomial logistic regression. Several modeling issues are addressed.

Bio: *Christina Mastrangelo* is an Associate Professor of Industrial & Systems Engineering at the University of Washington. She holds BS, MS and Ph.D. degrees in Industrial Engineering from Arizona State University. Prior to joining UW in 2002, she was an Associate Professor of Systems and Information Engineering at the University of Virginia. Dr. Mastrangelo has several years of industrial manufacturing experience at AlliedSignal Aerospace, Honeywell IACD and Ion Implant Services. She has published over 20 journal papers in the area of empirical stochastic modeling and statistical process monitoring. One of the papers received the Ellis R. Ott Award for significant contribution to the field of quality engineering. She is a member of ASA, ASEE, ASQ, INCOSE, INFORMS, WEPAN, and a senior member of IIE.