

# EPSTEIN INSTITUTE SEMINAR ▪ ISE 651

## Closed Loop Tolerance Engineering Modelling and Maturity Assessment in a Circular Economy Perspective

**ABSTRACT** - Decisions made in the development stage of a new products will affect the whole lifecycle of the product. Manufacturing costs, product performance, maintainability and customer satisfaction in the use phase are parameters the engineers need to consider. In a sustainability perspective can durability and a potential long lifetime with less breakdowns be regarded as positive. Additionally, in a circular economy perspective the potentials for easy disassembly, recyclability and remanufacturing or reuse at the end of life are important. The selection of precision levels and tolerance limits on geometry and material properties in the design phase of mechanical components are decisive for these aspects. While tolerance selections traditionally focused most on meeting customer requirements and interchangeability of parts for assembly, the product development engineers are now facing several "Design for X"- challenges where tolerance selections and distributions are one of the key issues. This paper describes a Closed Loop Tolerance Engineering (CLTE) model describing information flow for tolerance engineering throughout the product lifecycle. The model includes feed forward and feedback of data and information between functional requirements description, tolerance synthesis and analysis, manufacturing process capabilities, measured product performance and end-of-life considerations.



**Dr. Kristian Martinsen**

Professor  
Department of Mechanical and  
Civil Engineering  
Norwegian University of Science and  
Technology

**SPEAKER BIO** – Dr. Kristian Martinsen is a professor at the Norwegian University of Science and Technology. His research area is Manufacturing engineering, with focus on sustainable manufacturing, industry 4.0 and quality engineering. He is the manager of the manufacturing engineering group at the Department for Manufacturing and Civil Engineering in the Faculty of Engineering.

**USC Viterbi**

School of Engineering  
*Daniel J. Epstein Department of  
Industrial and Systems Engineering*

**TUESDAY, OCTOBER 29, 2019**

**3:30 PM – 4:50 PM**

USC ANDRUS GERONTOLOGY CENTER (GER), Room 206