



# Exponent®

Engineering & Scientific Consulting

## Mark Gutttag, Ph.D.

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## Professional Profile

Dr. Gutttag specializes in aerodynamics as well as solid and structural mechanics using both precision experiments and finite element analysis (FEA). His expertise includes designing and building complex experimental setups using various rapid prototyping techniques including laser cutting, 3D-printing and basic machining.

Dr. Gutttag also has extensive experience in data acquisition and processing using both LabView and Matlab. He has applied his skills working in the sports industry in a research capacity. In addition, he has experience investigating occupational incidents associated with construction and general industry including industrial equipment and machinery.

Prior to joining Exponent, Dr. Gutttag worked as a laboratory manager at École Polytechnique Fédérale de Lausanne (EPFL), in Lausanne Switzerland. As a laboratory manager, he was responsible for the planning and setup of the early stages of a high end experimental mechanics research laboratory. Before his time at EPFL, Dr. Gutttag worked as a graduate research fellow at Massachusetts Institute of Technology in the Department of Mechanical Engineering. His research was focused at the intersection of aerodynamics and structural mechanics. He explored the effect of surface texture on the aerodynamic drag of bluff bodies. Dr. Gutttag designed and built dimpled and grooved cylindrical specimens with surface shapes that could be modified on demand via pneumatic control. He constructed a custom test setup to interface with an existing wind tunnel to perform aerodynamic experiments in which he could simultaneously control the surface shape, measure and change the wind speed, and measure and record the drag on the specimens.

During his Masters work, Dr. Gutttag explored concept of controlling the surface shape of composite materials. Using a combination of FEM and physical experiments he studied how distributing stiff particles in soft matrix could affect the local surface shape that resulted from an applied global deformation. His senior thesis at Brown University involved performing simulations of head impacts in football to study traumatic brain injuries.

## Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Massachusetts Institute of Technology (MIT), 2018

M.S., Mechanical Engineering, Massachusetts Institute of Technology (MIT), 2014

Sc.B., Mechanical Engineering, Brown University, 2012

National Defense Science and Engineering Graduate Fellow, 2014-2017

Elected Member of Sigma Xi - Scientific Research Honor Society, 2011

Elected Member of Tau Beta Pi - Engineering Honors Society, 2010

## Prior Experience

Laboratory Manager, Flexible Structures Laboratory at École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland. 2018

Graduate Research Fellow, Elasticity, Geometry and Statistics Laboratory at Massachusetts Institute of Technology, Cambridge, MA. 2014-2017

Engineering Consultant, Parsons Xtreme Golf, Scottsdale, AZ. 2016-2017

Engineering Intern, Dassault Systems Simulia Corp, Providence, RI. 2011-2012

## Professional Affiliations

American Society of Mechanical Engineers (ASME), 2018-Present

ASTM F08 committee on Sports Equipment, Playing Surfaces, and Facilities, 2018-Present

ASTM F15 committee on Consumer Products, 2018-Present

## Publications

Guttag M., Yan D., Reis P. Programmable Aerodynamic Drag on Active Dimpled Cylinders. Advanced Engineering Materials 2019; doi:10.1002/adem.201801315

Guttag M., Karimi H.H., Falcón C., Reis P. Aeroelastic Deformation of a Perforated Strip. Physical Review Fluids 2018; 3(1) 014003

Guttag M., Reis P. Active Aerodynamic Drag Reduction on Morphable Cylinders. Physical Review Fluids 2017; 2(12): 123903

Guttag M., Boyce M.C. Locally and Dynamically Controllable Surface Topography Through the Use of Particle-Enhanced Soft Composites. Advanced Functional Materials 2015; 25(24):3641-3647.

Bar-Kochba E., Guttag M., Sett S., Franck J.A., McNamara K., Crisco J.J., Blume J., Franck C. Finite Element Analysis of Head Impact in Contact Sports. SIMULIA Community Conference 2012.

Bress T., Kennedy E., Sullivan M., Guttag M. (2020, January). Assessment of Elevator Risk and Code Requirements to Address These Hazards. Published in Vol. 13: Safety Engineering, Risk and Reliability Analysis of the ASME 2019 International Mechanical Engineering Congress and Exposition Proceedings; doi:10.1115/IMECE2019-11451

Bress T., Kennedy E., Sullivan M., Guttag M. (2020, January). Risk Assessment of Escalator Sidewall Entrapment Between the Years 1990 and 2017. Published in Vol. 13: Safety Engineering, Risk and Reliability Analysis of the ASME 2019 International Mechanical Engineering Congress and Exposition Proceedings; doi:10.1115/IMECE2019-11432

Bress T., Kennedy E., Guttag M. (2021, February). Assessment of Elevator Risks and Code Requirements Associated with Slip, Trip and Fall Hazards. Published in Vol. 14: Safety Engineering, Risk and Reliability Analysis of the ASME 2020 International Mechanical Engineering Congress and Exposition Proceedings; doi: 10.1115/IMECE2020-24092

Kennedy E., Gutttag M., Bress T. (2021, February). Assessment of Mobile Elevating Work Platforms Risks and Review of Changes Introduced in New Industry Standards to Address These Hazards. Published in Vol. 14: Safety Engineering, Risk and Reliability Analysis of the ASME 2020 International Mechanical Engineering Congress and Exposition Proceedings; doi: 10.1115/IMECE2020-24171

Kennedy E., Gutttag M. A Closer Look at Machine Guarding Regulations and Industry Standards. 24th Annual New England Area American Society of Safety Professionals Professional Development Conference. Presented November, 2022

### [Additional Education & Training](#)

OSHA 10-Hour General Industry Training, 2018