

**Nicoli M. Ames, Ph.D., P.E.**  
**Senior Engineer**

**Professional Profile**

Dr. Nicoli M. Ames is a Senior Engineer in Exponent's Mechanical Engineering practice. Dr. Ames specializes in polymer mechanics, specifically with regards to constitutive model development, experimental thermal-mechanical material characterization, and finite element analysis (FEA). She has modeled rubbers, foams, and engineering plastics for a variety of applications that have accounted for mechanical, thermal, and/or time-dependent behavior such as creep and viscoelasticity. She is also familiar with various polymer forming techniques; her doctoral research at the Massachusetts Institute of Technology focused on experimental and numerical analysis of polymer micro-hot-embossing for use in mass production of microfluidic devices.

While at Exponent, Dr. Ames has applied her FEA skills in a wide range of industries. She has performed geomechanical analysis to determine casing deformations for clients in the upstream drilling and completions sector. Additionally, she has performed structural analysis on water storage tanks, pressure vessels, rail cars, turbine generator components, consumer electronics, household products, and medical devices.

She also has experience customizing the Abaqus finite element software. She has written user material subroutines (UMAT / VUMAT) for a variety of materials, and also user elements (UEL) that have incorporated mechanical, thermal and porous behavior for modeling oil reservoir rocks. She has also helped clients develop Python graphical user interfaces to improve workflow in the Abaqus CAE software.

Prior to joining Exponent, Dr. Ames was a staff member at Sandia National Laboratories in the Multi-Physics Modeling and Simulation department. During her time there, she performed thermal analysis on an existing weapon system and investigated the performance of mechanical contact algorithms in a variety of FEA codes.

**Academic Credentials and Professional Honors**

Ph.D., Mechanical Engineering, Massachusetts Institute of Technology (MIT), 2007  
S.M., Mechanical Engineering, Massachusetts Institute of Technology (MIT), 2003  
S.B., Mechanical Engineering, Massachusetts Institute of Technology (MIT), 2000

William L Stewart Jr. Award for Outstanding Contributions to Extracurricular Activities, 2006;  
Mechanical Engineering Department Service Award, 2006; Meredith Kamm Memorial Award  
for Outstanding Mechanical Engineering Graduate Student, 2003; MIT Rosenblith Fellowship,  
2000–2001; Luis de Florez Award for Outstanding Creativity, Ingenuity, and Originality in the  
Design and Construction of an Undergraduate Thesis, 2000

## **Licenses and Certifications**

Registered Professional Mechanical Engineer, California, #M35403

## **Publications**

Srivastava V, Chester SA, Ames, NA, Anand L. A thermo-mechanically coupled theory for amorphous polymers in a temperature range which spans their glass transition. *International Journal of Plasticity* 2010; 26(8):1138–1182. <http://dx.doi.org/10.1016/j.ijplas.2010.01.004>

Anand L, Ames NA, Srivastava V, Chester SA. A thermo-mechanically coupled theory for large deformations of amorphous polymers. Part I: Formulation. *International Journal of Plasticity* 2009; 25(8):1474–1494. <http://dx.doi.org/10.1016/j.ijplas.2008.11.004>

Ames NM, Srivastava V, Chester SA, Anand L. A thermo-mechanically coupled theory for large deformations of amorphous polymers. Part II: Applications. *International Journal of Plasticity* 2009; 25(8):1495–1539. <http://dx.doi.org/10.1016/j.ijplas.2008.11.005>

Anand L, Ames NM. On modeling the micro-indentation response of an amorphous polymer. *International Journal of Plasticity* 2006; 22(6):1123–1170.  
<http://dx.doi.org/10.1016/j.ijplas.2005.07.006>.

## **Presentations**

Ames NM, Anand L. Modeling and simulation of the hot-embossing process on amorphous polymers. Proceedings, 6<sup>th</sup> International Conference on Mechanics of Time-Dependent Materials, April 2008.

Ames NM, Srivastava V, Lele SP, Anand L. Modeling and simulation of the hot-embossing process for manufacture of microfluidic devices from amorphous polymers. Proceedings, 1<sup>st</sup> International Conference on Micromanufacturing, September 2006.

## **Professional Affiliations**

- American Society of Mechanical Engineers (member)
- Society of Plastics Engineers – Golden Gate Section (member)