# Faculty Member

## Timken Foundation Center for Precision Manufacturing

### *Contact Information*


Xiaosheng Gao, PhD, FASME
Professor
Mechanical Engineering Department
University of Akron
ASEC 110E
244 Sumner St., Akron, OH 44325

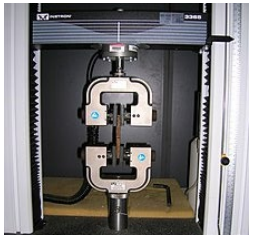
Email: xgao@uakron.edu
Phone: 330-972-2415
https://www.uakron.edu/engineering/ME/people/profile.dot?u=xgao


### *Research Interests*

- Mechanics of materials and structures
- Constitutive modeling of advanced materials
- Material characterization with microstructure
- Fatigue and fracture mechanics
- Mechanism-based approaches for damage and fracture
- Structure integrity and reliability assessment
- Multiscale, multiphysics modeling and simulation
- Finite element analysis of manufacturing process and structural response

### *Sample Research I: Mechanism-based approaches for failure analysis*

- Finite element analysis provides a non-destructive means of testing products, faster prototyping for "what if" scenarios, and design optimization.
- We have developed a variety of constitutive, damage and fracture models for metals, composites and smart materials, and implemented them in finite element software.
- The mechanism-based models address the fundamental issue of fracture mechanics principles: the transferability from standard, laboratory specimens to complex structural components.



### *Sample Research II: Multiscale modeling of hydrogen embrittlement*

- Dissolved hydrogen atoms in metals degrade the material's mechanical properties, resulting in material failing at a lower level of load than it can normally bear.
- Several mechanisms have been proposed, such as hydrogen enhanced decohesion and hydrogen enhanced localized plasticity.
- This research develops models for multiscale simulation of hydrogen embrittlement.