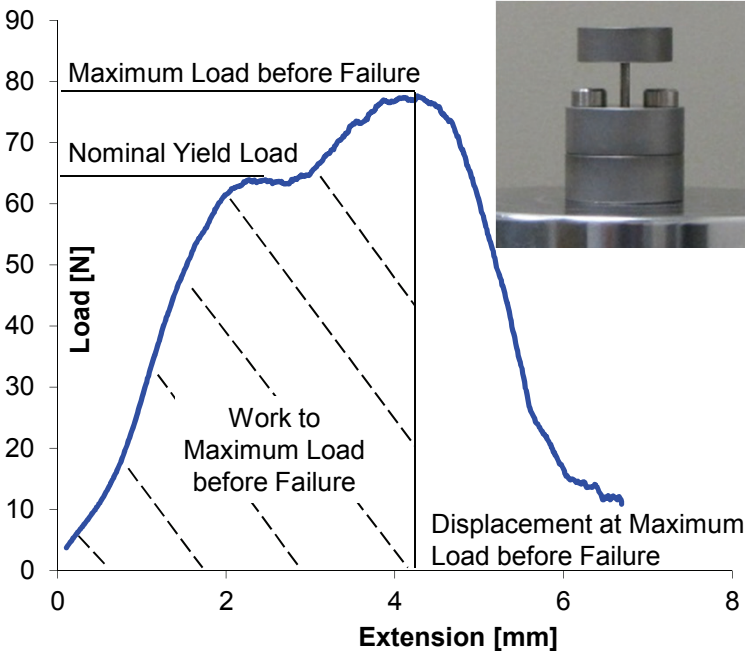


# Small punch mechanical analysis of polyethylenes

## Summary

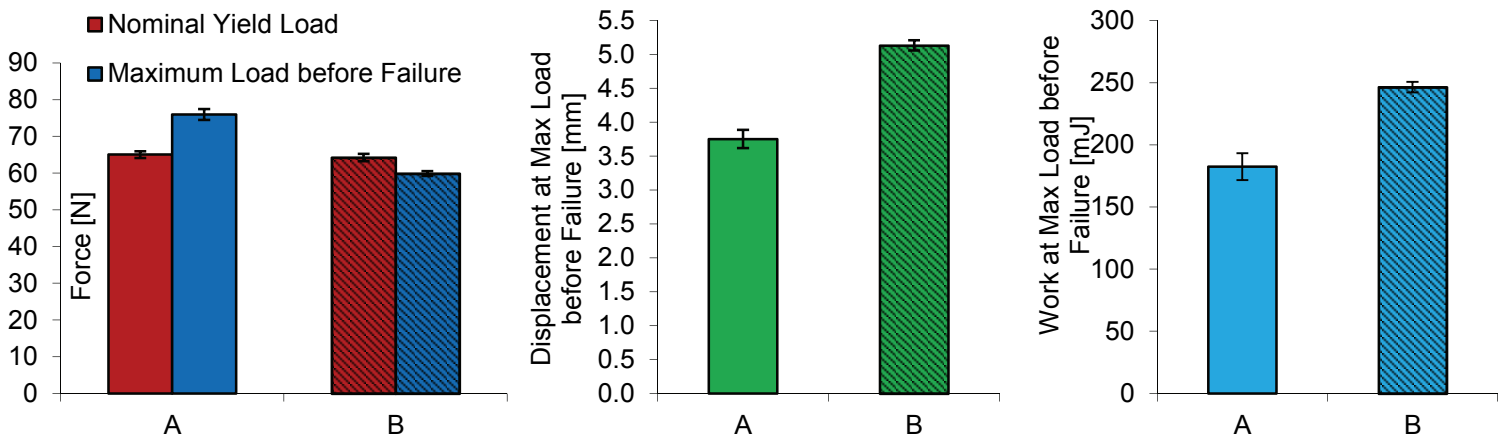
Small punch testing of polyethylenes is an industry standard mechanical test (ASTM F2183) used to assess the mechanical properties of consolidated polyethylene. Inferences about the elastic deformation, plastic deformation, and plastic yield of the material can be determined by analysis of the force-displacement curve. This technique has received increasing interest recently because of the small sample volumes required. However, there is a wealth of extra information available in the data that can be utilized to further aid researchers.



## Description

For small punch testing, a tiny disc of UHMWPE is deformed by a hemispherical punch. The deformation creates a biaxial tension in the sample, as the edges are pinned between the die and guide. It is possible to determine stiffness, peak load, ultimate load, ultimate displacement, and work to failure for UHMWPE specimens. However, at CPG, we analyze all facets of the small punch data to determine relationships between first to third generation UHMWPEs that may be aged or unaged, contain antioxidant, and go through different processing conditions. We have also defined new parameters to fully characterize small punch load-displacement curves for highly crosslinked samples that fail by prolonged plastic yield rather than rupture.

## Data and outcomes



## Uses

- Quality control
- Biomedical materials
- R&D



**Cambridge  
Polymer Group**

Cambridge Polymer Group, Inc.  
56 Roland Street, Suite 310  
Boston, MA 02129

Ph: 1 (617) 629 4400  
Fax: 1 (617) 629 9100

info@campoly.com  
www.campoly.com  
ISO 9001:2008 Certified

Rev: 06/03/11

# ANALYZE • RESEARCH • CREATE

Cambridge Polymer Group, Inc. is a contract research laboratory specializing in materials. We partner with our clients to solve problems utilizing our multi-disciplinary research team and full service laboratory.

We work with clients throughout the product life cycle to:

- **Develop new materials**
- **Design prototypes for proof-of-concept studies**
- **Create and execute experimental design**
- **Validate and verify manufacturing processes**
- **Perform root-cause analysis in product failures**

Cambridge Polymer Group, Inc. was founded in 1996 to provide a cost-effective resource for testing, research and development to clients who need periodic access to Ph.D.-level scientists and their support structure. We have developed a host of testing methods and materials for our clients, which number more than 300.



Cambridge  
Polymer Group



Cambridge  
Polymer Group

Cambridge Polymer Group, Inc.  
56 Roland Street, Suite 310  
Boston, MA 02129

Ph: 1 (617) 629 4400  
Fax: 1 (617) 629 9100

info@campoly.com  
www.campoly.com  
ISO 9001:2008 Certified

Rev: 06/03/11