

the Energy to Lead

Technologies to Repair Gouges, Cracks and Anomalies in High Pressure Plastic Pipelines

Ernest Lever
R&D Director
Gas Technology Institute

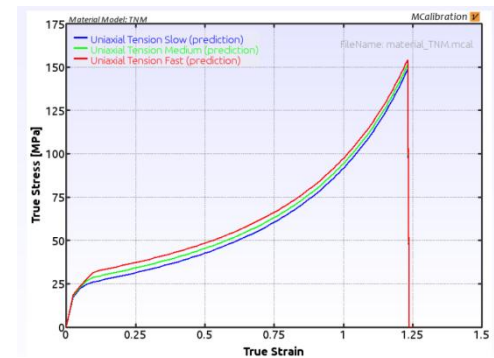
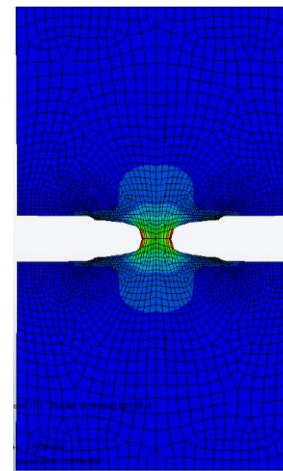
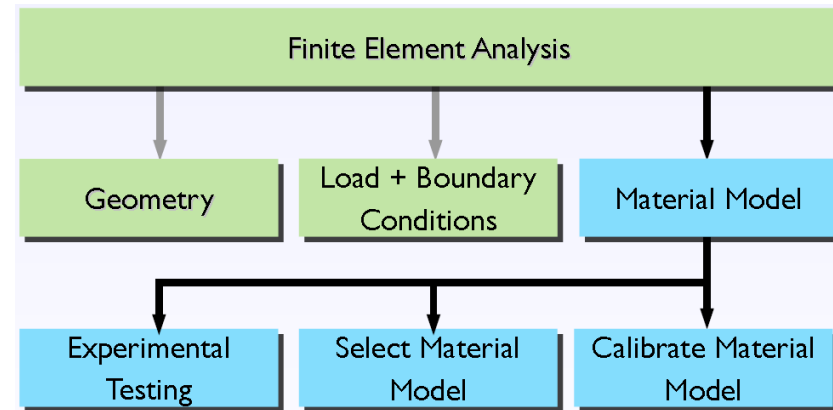
Gouges and Cracks in Plastic Pipe

- > Successful technologies for repairing damage to high pressure plastic pipelines will entail working through several methodical steps:
 - A methodology to properly quantify the wall stress induced by different configurations of damage to the wall of non-metallic pressure pipe (PE, PA, Composites)
 - Formal process to quantify the total risk to public safety due to pipe wall damage together with interacting environmental, service and material conditions - Threat Interactions
 - Identifying new technologies that can be used to repair plastic pipe damage
 - Conducting initial feasibility studies for the most promising new plastic pipe damage repair technologies

Pipe Stresses Induced by Damage

> Additional Research Needs

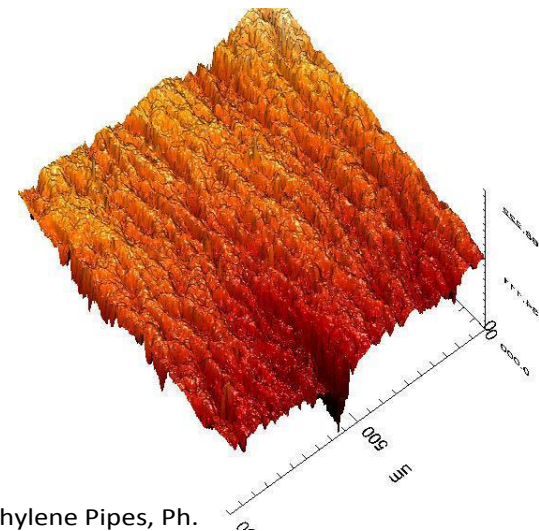
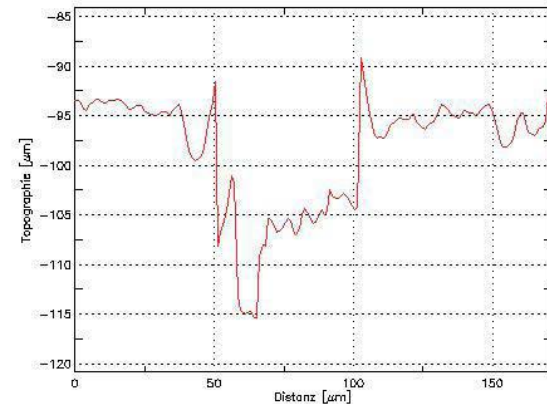
- Use state-of-the-art methods to compile the appropriate tables and equations to allow the fitness for service of damaged plastic and non-metallic pipe to be assessed



Survey Typical Plastic Pipe Damage

> Additional Research Needs

- Collect an extensive sample of damaged plastic pipe from operators, manufacturers and other sources
- Conduct 3-D scans of the damage
- Prepare statistical distributions of damage geometry
- Prepare probabilistic distributions of likelihood of failure due to typical in-field damage to plastic pressure pipe



Emerging Technologies for Plastic Pipe Damage Repair

> Additional Research Needs

- Recent advances in Nano-composite technology may be suitable for targeted and precise repair of scratched, gouged or cracked pipe
- A well formulated research program that properly identifies repair methodologies for the types of damage that introduce the greatest risk for failure
- Conduct carefully planned feasibility studies for each promising technology to properly define the type and extent of damage that can be repaired
- Prepare lifetime prediction methodologies for the repaired systems

Comprehensive Industry Guidelines for Plastic Pipe Damage Mitigation

> Additional Research Needs

- Prepare a comprehensive fitness for service standard for plastic and other non-metallic pipe
- Prepare comprehensive industry guidelines outlining:
 - > How to determine what pipe damage needs to be mitigated, and
 - > What repair technologies are best suited for plastic and other non-metallic pipes