

Probabilistic-Diagnostic Informed Innovations for Power Transmission Light-Weighting

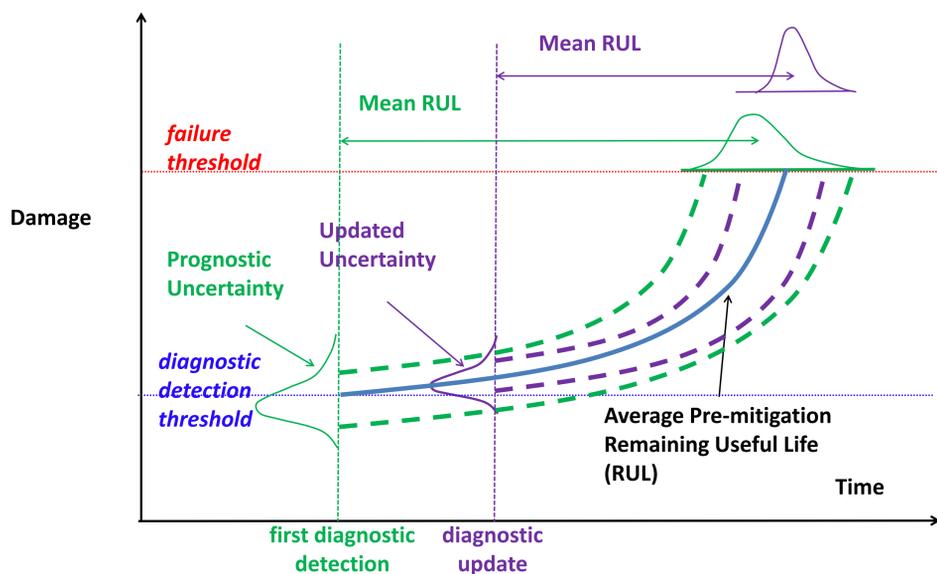


S&T Campaign: Sciences for Maneuver
Energy and Propulsion: Distribution & Transfer

Adrian Hood, Ph.D., (410) 278-9581
adrian.a.hood.civ@mail.mil
Michael Shiao, Ph.D., (410) 278-4780
chi-yu.shiao.civ@mail.mil

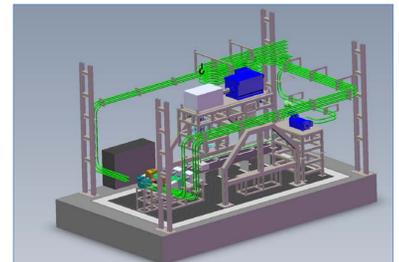
Research Objective

Develop innovative design concepts to optimize power density in drive systems of Army vehicles by leveraging advancements in health state awareness using a probabilistic and damage tolerance based framework.



ARL Facilities and Capabilities Available to Support Collaborative Research

- Drives System Research Lab (coming in early 2016)
 - 2000 HP dual input helicopter transmission test stand
 - 1000 HP full scale tail rotor drive test stand
 - 250 HP Ground Vehicle Driveline test stand
- Higher Performance Mechanical Component Lab
 - 25,000 RPM Test Stand
 - 60,000 RPM Test Stand
- Tribology Equipment
 - WAM14 Ball on Disk Tribometer
 - CETR UMT-3 tribometer
- Degraded Grease Bearing Rig
- 22 Kip Load Frames



Challenges

- Quantifying uncertainty for probabilistic analysis
- Sensor technologies with high sensitivity to driveline component damage
- Updating component health in real time

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- Expertise in helicopter drivelines and mechanical components
- Expertise in planetary gear dynamics
- Modeling and simulation for damage progression and failure prediction
- Expertise in probabilistic life estimation

