Biaxial Tensile Test Fixture

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Sponsor: Cummins Inc.

PROJECT SCOPE

- Biaxial test data is the most difficult data to acquire due to the rarity of biaxial test machines in labs
- A test fixture is needed to perform biaxial tension tests in uniaxial test machines

NEEDS ASSESSMENT

- Fixture should be designed for use with an MTS machine with no modifications
- Build prototype and manufacture specimen pieces for testing
- Validate the fixture and data acquisition

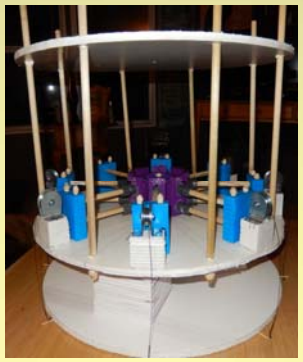
BACKGROUND

- The frictional effects that occur during uniaxial compressive testing of gasket material generates inaccurate data
- Biaxial tensile strain is equivalent to a uniaxial compressive strain

SPECIMEN DESIGN

- Force simulations were done to determine which specimen geometry would be chosen

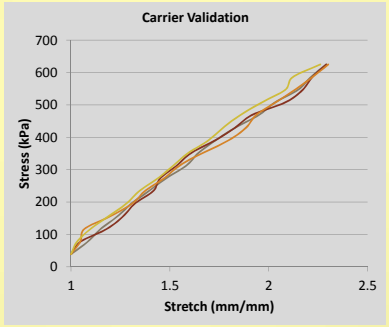
Design



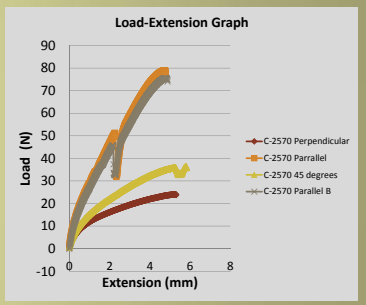
Model

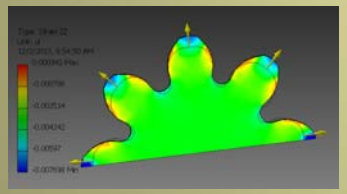
Prototype

Baseplate components



Strain measurement

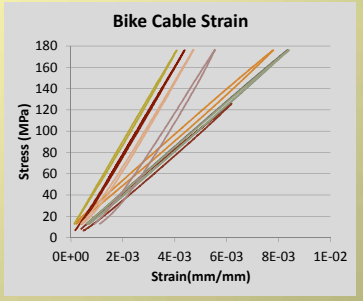


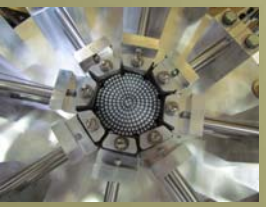


ZZ Strain Profile

Specimen Manufacturing

Carrier and wire cable attachment





Before loading

Before fracture

Fracture

FUTURE WORK

- Load cells on each cable so force can be calculated per carrier
- Use of digital image correlation data acquisition to measure radial strain

CONCLUSION

- Accomplished the scope of the project and met our sponsor's needs
- Further calibration is needed to verify the accuracy of the data

ACKNOWLEDGEMENTS

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