Guidelines for the Design, Testing, and Fabrication of Disc Bearings

AASHTO T2 Technical Subcommittee
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Acceptance of disc bearings is becoming more common in project specifications (at least 22 states). Unfortunately the code only provides limited information for the design of critical components:
- Selection of elastomer for disc & disc thickness
- Need for limiting rings (minimize bulge and vertical deflection)
- Design details for shear restriction mechanism (No guidance on horizontal load carried by disc)
- No reported problems to date, but lack of design guidelines could lead to future problems

Need for Improved AASHTO Specification
Section 14.7.8 – Disc Bearings

- Conduct horizontal load tests on 9 different disc bearing assemblies to study these variables:
  - Contribution of elastomeric disc on load capacity
  - Connection of shear pin to bottom plate (Threaded, Welded, Force Fit details)
  - Thickness of bottom plate for pin engagement
- Bearing designed for 850 kip vertical load and 85 kip horizontal load

Pilot Test Program Conducted at DS Brown

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Pilot Test Program Specimen

- 2" Urethane Disc (OD=15.5")

Pilot Test Program Test Procedure

- Contribution of Urethane Disc With Disc
- Contribution of Urethane Disc Without Disc
- Contribution of Urethane Disc With Disc and Without Disc

Contribution of Urethane Disc

With Disc

Without Disc
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- Summary of findings from pilot study:
  - Urethane disc has significant impact on horizontal load capacity
    (Should this be considered in design? Testing?)
  - Although threaded pin connection had lowest stiffness it carried highest load without failure
  - Failure of pin by bending of section is not a concern in most cases
  - Thickness of base plate and embedment of pin into plate has considerable impact on horizontal load capacity

- Review of literature indicates limited prior research
  - NCHRP Report 432 from 1993 (2 topics out of 25 on disc bearings)
  - AASHTO Specification requirements based on limited information in FHWA Standard 106 (aka “SCEF Specification”)

- NCHRP Problem Statement developed on “Guidelines for the Design, Testing and Fabrication of HLMR Disc Bearings”
  - Developed with industry and academic input
  - Focused on producing a more comprehensive set of AASHTO specifications for this HLMR bearing alternative
  - Project duration of 24 to 30 months
  - Estimated Budget of $500,000

- Looking for support from T2 committee and other owners to move project into next phase of process