Biaxial Rocking Motion
Hip Wear Simulators

Matt Paul
Biaxial Rocking Motion Hip Wear Simulators

- Most popular
- Hundreds used since 1980s
- Provides close approximation to gait wear
Biaxial Rocking Motion Hip Wear Simulators

- Harry McKellop
- Exclusively for wear testing
- Realistic compromise between wear screening devices and full scale modeling systems
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- Uses axial/rotation and servohydraulic/mechanical design
- Microprocessor-based function generator can program any load pattern
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- Load axis is always vertical
- Upper component provides the load
- Lower component provides the motion
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- Joint can be upright or upside down
- Bearing surface inclined 23°
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- Bearing block spins around
- Chamber is restricted from rotating with inclined block
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- Wear chamber contains lubricating fluid
Typical experimental method

- Paul-type curve loading profile
- Bovine blood serum
- Weigh original components to determine wear rate
Recent Developments

1996: Maxian, Brown, Pederson, Callaghan

• 1.7 x wear rate of human gait inputs
• direction of wear was near cup apex rather than near the posterosuperolateral quadrant
Recent Developments

2002: Saikko, Calonius
- Confirmed location of wear nearer apex
- Wear pattern unlike gait wear pattern
- Offset rotation-prevention lever produces slightly different wear patterns
References