Need for road pavement recycling = Need for research

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Variability of recycling

- Cement concrete pavements
  - Rubblizing
  - Base course
- New asphalt pavement
- New cement concrete pavement
Resonant Rubblizing

- High Frequency (44Hz)
- Low Amplitude (1/2"

Interlocked rubble distributes loads

Slab fractured

Base integrity maintained

Flat Bottom maintains load-bearing capacity of rubble

No displacement into base
Multihead hammer
Variability of recycling

- Asphalt pavements
  - Flexible
  - Semi-rigid
- Hot recycling
  - Surface courses (wearing and binder courses)
- Cold recycling
  - Base courses
Variability of recycling

- Hot or cold
- In place or in plant
- Additives:
  - Bitumen
    - Emulsion
    - Foam bitumen
  - Cement
  - Aggregate
- Variability of recycling = Opportunity for design of material and pavement properties
Cold recycling in place with cement
Cold recycling in place with cement and bitumen emulsion
Cold recycling in place with foam bitumen
Hot recycling in place
Hot recycling in place
Cold recycling in plant
Hot recycling in plant
Opportunity for design of material and pavement properties

- Performance-based (related) properties
  - Stiffness
  - Fatigue characteristics
  - Permanent deformation resistance
  - Water resistance
  - Cracking resistance

- Opportunity for Long Life pavement design
Long Life Pavement concept

- Stiffer asphalt base of longer fatigue life
- Lower strain – longer pavement fatigue life
- Indefinite Fatigue Life
Need for research

- New or recycled – the same performance-based test methods and requirements
- Material design
- Pavement design
- Limitations for recycling?
Have a nice and effective discussion