European Scanning Tour of PCC Pavements

E. Tom Cackler, P.E.
National Concrete Pavement Technology Center

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What Did We Learn?

• SCAN overview

• Findings

• Implementation Plan
Countries Visited

- Canada
- Germany
- Austria
- Belgium
- Netherlands
- United Kingdom
Scan Objectives

Identify techniques used in other countries, and implementable in the US, for achieving longer concrete pavement service lives
Findings: Pavement Selection Strategies

- “Concrete pavement” means “long life”
- Public’s concerns (congestion, safety, environment) influence pavement type selection
Findings: Pavement Design

- Design catalogs used in Austria, Belgium, and Germany
- Design lives of 30 years typically used; up to 50 years service expected
- Truck loadings are heavier than in US, supersingles are used more
Findings: Pavement Design

- Fewer tie bars used in longitudinal joints
- Smaller dowel bars (1-in-diameter) are used
- JCP and CRCP built to same thickness in most countries visited
- CRCP used with good success for long life in Belgium; design and construction technology adopted from the US
Findings: Pavement Design

- Sealed and unsealed joints appear to perform equally well
- Open-graded permeable layers in Canada but not Europe; dense HMA and CTB layers are used; also unstabilized bases in Germany
- Thick geotextile now used to separate CTB and PCC in Germany
- Foundations are drainable, stable, protect against frost, and allow recycling of materials
Findings: Construction and Materials

- Moderate-alkali cements and blended cements used to mitigate alkali-silica reaction

- High level of attention given to aggregate selection, quality, and gradation ...

- ... Especially for top layer in two-course construction
Findings: Construction and Materials

- Recycled concrete and recycled asphalt pavement used (or mandated) in lower layer in two-course construction

- Intelligent compaction and plate load test used
Implementation

Important part of Research

Can be challenging

…timing is everything…
Implementation Items

• Two-lift Construction *
• Design Features Catalog *
• High Quality Foundations *
• Mix Design Components
• Geotextile Interlayer *
• Exposed Aggregate Surfaces *
Two-lift construction*
Two-lift Implementation Plan

• Provide Technical Support to States (currently California, Florida, Georgia, Indiana, Kansas, Michigan, Minnesota, Oklahoma, Pennsylvania, Texas, Washington)

• CP Tech Center coordinating with FHWA

• Use for economical and environmental reasons

• Matrix of possibilities => Pilot in several states
### Design Features Catalog

#### EU 92 to 06

### USA 92 to 06

#### Thickness [cm] vs. Bearing Value [MN/m²]

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### Notes

- *Design features catalog* includes tables and diagrams comparing thickness values and bearing values for different materials and applications.
- The data is presented for both EU and USA standards from 1992 to 2006.
Super-Sized Pavements
Construction of high-quality foundations*

• NCHRP project and Intelligent compaction pooled-fund

• Iowa State- small-plate load testing
FHWA effort

- Advanced Quality Systems/ Intelligent Construction Systems Task Force
  - Intelligent compaction
  - Intelligent plant techniques
    - Automatic samplers, etc.
Greater attention to mix design components
Implementation Plan

Greater attention to mix design components:

• Emphasis on mix design

• Blends and ternary mixes

• Higher strengths in top layer of two-layer construction
Geotextile separation interlayer*

Develop experimental testing plan

Looking at ramp project to evaluate constructability
Exposed aggregate surfacing*