National Perspective on Concrete (Pavement)...

Gerald Voigt, President & CEO
US Construction Materials Market Change 2006-2010

U.S. Concrete Paving – Growth Over Time!

Source: Calculated from Square Yard paving items in Oman Systems Bid Tabs Pro.
Drivers to Growth...?

- **Cost** – Competitiveness of concrete better than ever
- **Sustainability** – The demand for sustainable solutions stronger than ever
- **Technology** – There is a wider array of concrete solutions
New Cost Reality
Paving Material PPI Comparison...

Old Reality: 1982-2004
Average Annual Concrete PPI Increase: +2.1%
Average Annual Asphalt PPI Increase: 1.1%

Average Annual Concrete PPI Increase: +4.0%
Average Annual Asphalt PPI Increase: 12.0%

Source: Bureau of Labor Statistics, Producer Price Indices

1996 = 100
Impact of Competition... Between Industries

Competition between industries is “found money” for a DOT that has primarily relied on asphalt...
The Way I See It #289

So-called “global warming” is just a secret ploy by wacko tree-huggers to make America energy independent, clean our air and water, improve the fuel efficiency of our vehicles, kick-start 21st-century industries, and make our cities safer and more livable. Don’t let them get away with it!

— Chip Giller
Founder of Grease.org, where environmentally minded people gather online.

This is the author’s opinion, not necessarily that of the organization to which he or she is employed. To read more or respond, go to www.thewayiseethings.com.
What is Sustainability?

- New reports explain... longevity is the primary opportunity!!
Longevity Means...

Less-frequent reconstruction!

- Lower consumption of raw materials
  - Cement, aggregates, steel
- Lower energy consumption
- Raw material processing
- Rehab and reconstruction
- Congestion
Longevity Means...

- Reduction in pollutants
  - Manufacturing, construction, congestion
- Lives saved
  - Rigid structure
  - Profile durability
  - Infrequent construction zones
- All these translate into economic benefits...

Longevity is **the crucial element of sustainability!**
Sustainable Opportunities *Beyond* Longevity

Can be achieved through *selection, design and mixture optimization*!

- **Renewal and Recycling** (Aggregate for Base & Mixture)
- **Less Fuel Consumed During Construction** (Less Equipment/Passes)
- **Industrial By-Product Use** (Fly Ash, Slag, Ternary)
- **New Quiet Surface Textures** (NGCS)
- **Pervious Concrete Shoulders** (Improved Storm Water Quality)
- **Optimized Structural Capacity** (MEPDG, StreetPave)
Sustainable Benefits Beyond Construction

THE USE PHASE...
Even larger impact than construction. Pavement deflection and roughness impact vehicle fuel efficiency.

Per MIT Pavement Vehicle Interaction Research... to achieve the same stiffness and fuel consumption, asphalt pavement has to be about 60% thicker than concrete pavement.
Evolving Technology is Everywhere!

- Smart Cure Curing
- Stringless Paving
  - Surface smoothness or rideability
- DARWin-ME & StreetPave
  - Thickness Design
- Concrete materials
- Ternary Mixes
- Dowel bars
- Standardization & New Materials
  - Dowel bar Insertion
- Alternate designs
  - Overlays/Roller Compacted/Pervious
- NGCS & Other Quiet Surfaces
  - Surface Texture
- Subgrade
  - Intelligent Compaction
Intelligent compaction and stringless trimming of the grades...

• Improves uniformity
• Improves performance
• Helps pavement smoothness
Stringless paving technology for milling and slipform paving...
• Improves smoothness
• Improves safety
• Reduces costs
Variable-width paving...

- Adds versatility
- Saves set-up/change time
Two-lift Construction (wet on wet)...

- Facilitates recycling
- Optimizes use of aggregate
- Allows innovative surface layer
More Sustainable and Durable Mixtures...

- Optimizes mixtures
- Use available resources
- Improves durability
Ground Penetrating Radar mounted on the paver to provide a ‘real time’ picture of tie bar placement...

• Improves quality Control
Dowel Bar Options...

- Extends performance
- Optimizes design
- Improves efficiency
Dowel and steel locating devices...

- Improves Quality Control
- Improves Quality Assurance
SMART CURE - system mounted on the curing cart to provide a ‘real time’ picture of curing need and recommendations...
SMART CURE – Curing compound application altered per evaporation rate on site...

Improves Durability
• Saves repair time for ultra-high traffic
• Allows manufactured durability control
Roller-Compacted Concrete (RCC)...

- Opens to traffic quickly
- Very durable material
- Cost effective
Pervious Pavements...

• Versatile for storm-water issues
• Saves land for retention
Hot-Applied Polymer Resin Flexible Patching Materials...

- Elastic, Forgiving material
- Wide application possibilities
Self-Leveling, Cement-Based, Thin Overlay Repair Materials...

- Self-leveling
- Thin application possibilities
Next Generation Concrete Surface for Tire-Pavement Noise Control
NGCS has Been Placed in 10 States at 17-22 Locations with the Oldest Being 5 Years
Employs Diamond Grinding Equipment

I-10 in Phoenix
NGCS Construction (Two Parts)

Flush Grind

Groove
NGCS Texture

Grooves for Macro Texture

MicroTexture

Renewable for Preservation!
Arizona NGCS On I-10
Noise from Concrete Textures

**Transverse Tine**
- 103-110 dBA

**Conventional Diamond Grinding**
- 100-104 dBA

Twice as Loud

**Longitudinal Tine**
- 101-106 dBA

**NGCS**
- 99-101 dBA

Perspective: AZ ARFC varies from 96 dBA at Const. to 103 dBA after 7 yr.
Concrete Overlays
Concrete Overlays for All Situations

**Bonded Overlay System**
- Bonded Concrete Overlay of Concrete Pavements
- Bonded Concrete Overlay of Asphalt Pavements
- Bonded Concrete Overlay of Composite Pavements

**Unbonded Overlay System**
- Unbonded Concrete Overlay of Concrete Pavements
- Unbonded Concrete Overlay of Asphalt Pavements
- Unbonded Concrete Overlay of Composite Pavements

Old pavement becomes part of slab

Old pavement becomes base
Notable Recent Projects

- **I-70 Kansas**
  - 4 lane rural interstate – paved 30-ft wide
  - 6x6x6 design on asphalt
  - 1.5 million square yards

- **US-18 Iowa**
  - 2 lane highway
  - 4 in. nominal unbonded concrete on composite pavement
  - Maintained traffic on 2-lane rural project
I-70 Kansas Plan Section

40 ft.
I-70 Kansas Full-Width Paving

 Courtesy, Koss Construction
I-70 Kansas Stringless Paving

Courtesy, Koss Construction
I-70 Kansas 6x6x6 – Full Width Paving

Courtesy, Koss Construction
I-70 –
Nighttime paving to control built-in smoothness and help curing in “dog days” heat...
US-18, Iowa

Typical of thousands of miles of rural roads in U.S.
US-18 – Cross Section

Unbonded concrete overlay on asphalt includes widening with overlay
Stringless paving technology made this project possible to build under traffic...
US-18 – Stringless Profile Milling
US18 – Paving Under Traffic Scenario

- Steel
- Milled & Cleaned Surface
- Truck Avoiding Steel
- Traffic Control Min. Safety Distance
- Milled Surface (Existing 12' Lane)
- Gravel

New Concrete Overlay

US18 Bonded Concrete Overlay
US-18, Iowa

Stringless paving

Traffic management “without a detour”

Minimal clearances
Visit apps.acpaa.org to learn more
Closing Comments...

Early Experiments in Transportation
Demand is up!

Drivers include cost competitiveness, sustainability and new technology (solutions!)

Technology advancements are happening on many fronts

Concrete overlay use growing rapidly

This isn’t the “old” concrete industry anymore!
Closing Comments/Summary...

- With growth:
  - New pavers in the market
  - New designers (and owners)
  - New ideas

- These are challenges we must address
Where is ACPA Heading...

- We’ve Adapted to:
  - The new trends/market conditions
  - Customer’s changing needs

- We’re Focused on:
  - Helping maintain/improve construction quality
  - Helping public sector adopt new technology
  - Producing cost-effective long-term solutions
  - Producing cost-effective short-term (preservation) solutions
Thank You ACPA Members…!

- Membership development and delivering value to members is top priority for ACPA
  - Strength in numbers
  - Foster innovation
  - Invest in the industry
- It is together that we make it happen
- We can’t do it without you!
Questions?

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Pavements 4life

www.pavements4life.com