Next Generation Concrete Surface

Industry Innovations in Quiet Pavement Technology
Next Generation Concrete Surface (NGCS)

Term used to describe a category of texture(s) that have evolved through current research. The term may apply to several textures that evolve for both new construction and rehabilitation.
How did we get here?
The Noise Issue Comes to Phoenix
The Noise Issue Comes to Phoenix

- 1995 - ADOT conducts first formal noise research comparing ARFC vs. concrete
- 2002 - ADOT actively begins noise research
- Community resentment grows against noise
- ADOT utilizes random transverse tining
- Public outcry reaches Governor’s office
- $34 million ARFC overlay program initiated
ADOT agrees to a Diamond Grinding test section

- Conducted in 2003
- Conducted on SR-202 between 56th street and Kyrene Road westbound
- 3,000 lf. in length, 3 lanes wide
- Multiple grinding configurations applied
What did we learn in Arizona?

• Improved smoothness
• Improved friction
• Improved cross slope
• Reduction in noise
Bottom line

We knew we weren’t quiet enough
Purdue Research

- Optimize grinding
  - Blade Spacing
  - Blade Width
  - Depth
- Joint Effect
  - Joint Opening
  - Joint Faulting
- Innovative Surfaces
  - To be determined and tested
Purdue Tire Pavement Test Apparatus (TPTA)

- Tested 24 Diamond Ground Sections
- Developed Texture Measurement Laser System
- Incorporating Friction Measurement Capability
- Incorporating Rolling Resistance Measurement Capability
- Meet with Tire Manufacturers to Discuss Tire Noise
Test Pattern at Purdue
Test Pattern at Purdue
Next Generation Concrete Surface (NGCS)
Figure 1 Layout of Mn ROAD Low Volume Road Road Sections
MNROAD Innovative PCCP Texture Field Research
Figure 2: Track Locations for Diamond Grinding and Joint Effects Experiments

Legend:

- TS 1: Triple Chopper Blades with 125 blades
- TS 2: Flush Grind with Texture Grooving on 1/2" centers with 0.125 blades
- TS 3: Diamond Grind with 0.125 blades & 0.120 spacers
- TS 4: Existing Random Transverse Tining Texture (e.g., Unmodified)
Figure 7 Blade and Spacer used in Conventional Diamond Grinding Process
Figure 10 Close Up of TS1 Single Pass Texture Immediately Behind Grinder
Close Up of Texture
Photo of Single Pass Grinding Head
Fig 4.1  DSI Diamond Grinding equipment complete with cutter and articulated water truck
Implementation Locations
Diamond Grinding – Conventional
Diamond Grinding – Next Generation
Issues and Concerns

- Winter conditions
- Durability over time
- Has not been proven on major projects
- Constructability
- Cost
Visit Us on the Web

International Grooving and Grinding Association
- igga.net

American Concrete Pavement Association
- pavement.com

Diamond Surface, Inc.
- diamondsurfaceinc.com