Racing Surfaces Testing Laboratory

Dr. Mick Peterson
Executive Director
Racing Surfaces Testing Laboratory
Racetrack Surfaces Testing Laboratory &
The Future of Racing Surface Safety

Michael “Mick” Peterson, Ph.D.
University of Maine
Christie Mahaffey, Ph.D.
Racing Surfaces Testing Laboratory
C. Wayne McIlwraith, BVSc, Ph.D.
Colorado State University

2012 Welfare and Safety of the Racehorse Summit
History of Racing Surfaces Testing Laboratory

- **2008 Welfare and Safety Summit:**
  - **RECOMMENDATION 1: TRACK SURFACES**
    - Promote consistent and safe track surfaces conditions
    - Identify laboratory where material can be sent for analysis

- **Launched 2009**

- **Primary support:**
  CARF, CDI, Oak Tree, NTRA, Jockey Club and NYRA

- **A 501(c)(3) non-profit.**

- **Work with 40 tracks, 15 on a regular basis test**
Racing Surfaces Testing Laboratory
How it Got Done (is getting done)

• Part time executive director
• 2 full time and 4 part time employees
• Work has resulted in 2 Ph.D.’s and 1 MS degrees
  – Dr. Mahaffey, Dirt Tracks
  – Dr. Bridge, Synthetic Tracks
• $300,000 in testing infrastructure in 900 ft$^2$ in Orono Maine
Goals for Surfaces
from the 2008 Welfare and Safety Summit

• The ability to monitor changes in materials
• Investigate factors necessary to maintain track stability such as UV inhibitors, watering etc.

First challenge: wax for synthetic tracks
Aging of Synthetic Surfaces

- A clear evolution of the performance of synthetic tracks after installation.
- Second year, less safe & balling

Outcome: Selection of wax for renovation

Additional Goals

• Develop an R&D model for synthetic, dirt and turf racing surfaces
  ― Procedures and methods: shear strength, load bearing, etc., for racing surfaces
  ― Best practices for track maintenance
  ― Continue improvement of track maintenance equipment design and utilization

• Outcome: understand sand durability, clay, fibers and wax

• Case study: Different track designs

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Shallow Sand Track

- Hoof contacts surface of track during impact.
- During breakover the hoof penetrates the cushion.
- Shear and penetration strength must be sufficient to avoid toe contact with base.
Track for Semi-Arid Climate

- Hoof contacts surface of track during impact.
- During breakover, hoof penetrates the cushion.
- The toe can come in contact with the pad without changing the dynamics of gait.
- Compromise Design: False Base
New tests on clay (X-Ray Diffraction) from the Racing Surfaces Lab

Design & maintenance is defined by rainfall & materials

<table>
<thead>
<tr>
<th></th>
<th>Clay content (%)</th>
<th>Organic content (%)</th>
<th>Annual Precipitation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shallow Sand</strong></td>
<td>2.35 (1.02)*^</td>
<td>0.26 (0.25)*^</td>
<td>120.2 (28.3)*^</td>
</tr>
<tr>
<td><strong>False Base</strong></td>
<td>3.57 (1.53)*</td>
<td>0.47 (0.35)*</td>
<td>107.7 (45.2)*†</td>
</tr>
<tr>
<td><strong>False Base with Pad</strong></td>
<td>6.76 (3.60)*^</td>
<td>2.49 (2.70)*^</td>
<td>66.0 (25.2)*^†</td>
</tr>
</tbody>
</table>

* ANOVA p<0.05
^ † Tukey-Kramer post-hoc p<0.05

**Outcome: Maintenance must match materials**

What about Safety of Horse and Rider?

- 3 different racetrack designs, Defined by maintenance, climate and clay mineralogy
- What is safest?
- Data is not statistically significant: This year, may not be the same next year

Best Dirt Almost as Safe as Synthetic!
Equine Injury Database... Looking at Tracks (Dr. Tim Parkin)

- Descriptive analysis: Not controlled for all factors!
  - Synthetic safer than turf
  - Turf safer than dirt

- Multivariable analyses: synthetic tracks / turf tracks / “fast” dirt tracks
  NOT significant for risk of catastrophic distal limb fracture.

- An "off" dirt track is significant: 20%-30% increase in the likelihood of catastrophic distal limb fracture.

*Synthetic Appears to be Better: A Great Dirt Track May be Comparable*
Make Every Dirt Track as Safe as the Safest Dirt Track!!!

• More Goals from WSS
• Establish daily reporting of maintenance on racetracks
  – Provide information for track management, owners, trainers, jockeys and racing public
  – Institute database of daily maintenance of the main and turf course

Manual Maintenance Tracking System in use at 4 Racetracks
Weather Tracking at 9 Racetracks
GPS Equipment Tracking

GPS Tracking of Critical Maintenance Equipment

Daily report of activity: Precision Farming For Horse Racing
What really matters?

**MOISTURE CONTENT!!!**

The Effect of Composition Variation is MUCH lower...
Key to Understanding: Database

- What is the difference between the best tracks and the other tracks? Hint: not always money!
- Technical support to raise the bar for every track in the industry

“Quality is never an accident; it is always the result of intelligent effort.” John Ruskin

“Quality means doing it right when no one is looking.” Henry Ford

“You can expect what you inspect.” W. Edwards Deming
Consistency -- Results

• Understand how the best tracks control variability
• Manage the track as a precision product rebuilt every day for training and racing
• Link this back to our goal, safety of the horse and jockey
Some Progress:
Biomechanical track tester:
Open source design, shared development

Some testing is becoming standardized
More Progress: Tools

Ground Penetrating Radar

• Most Common Finding: Track needs to be Graded

• Better Tool: Metal ruler or probe for
  – Synthetic
  – Shallow sand track
  – False base track

• Radar is only a tool

Carefully control variables, use the grader regularly!
We Have a Long Way to Go:

• Only a small minority of tracks are systematic in the approach to maintenance
• Regular testing is the exception not the rule
• Track maintenance and investment in the surface is reactive not pro-active
• Investment in finding causality is minimal
Big Goal from 2008 WSS

- Research potential causes of catastrophic injury
  - Review existing research and inform public and industry regarding other causes of musculoskeletal injury including microdamage, changes in training methods, unrecognized disease, potential role of rider, etc.
Tracks did not "cause" the problem, they CAN improve the situation

No disease no breakdown....

Issues in Musculoskeletal Disease

• Conformation
• Individual predisposition
• Pre-existing disease
• Shoeing
• Training
• Track surfaces
• Multi-factorial risk
Acknowledgements