

Scientific Approaches To Prevent Injuries

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THE UNIVERSITY OF
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The Big Issue is Catastrophic Injury

- Non fatal musculoskeletal injury is also important
- Welfare and Safety Summit On-Track Injury Statistics (Dr Mary Scollay):
 - Fatality rate 2.03/1000 starts on dirt tracks
 - Fatality rate 1.47/1000 starts on synthetic surfaces

This Presentation

- Track surface
- Injury data acquisition
- Biomarkers for prediction of injury



Surfaces

Standardized Tests,
Engineering Support &
National Laboratory

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Recommendations of:
The Welfare and Safety of the Racehorse Summit

Keeneland Sales Pavilion
Lexington, Kentucky
March 17-18, 2008



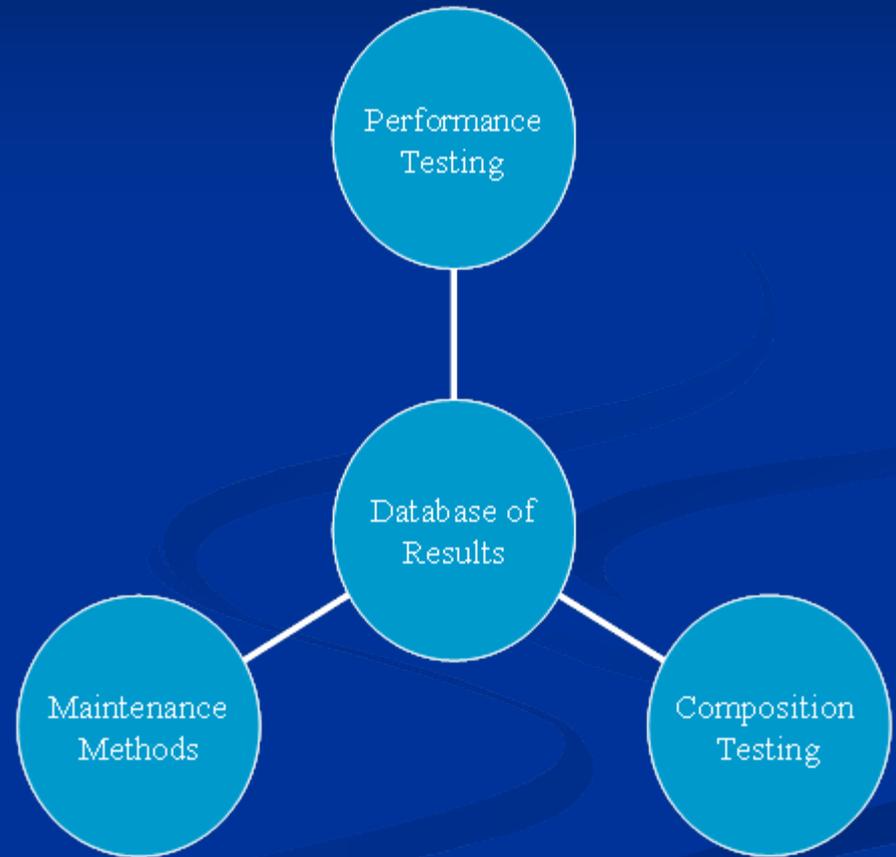
RECOMMENDATION 1:
TRACK SURFACES

Primary Objective:

**Promote consistent and
safe track surfaces conditions**

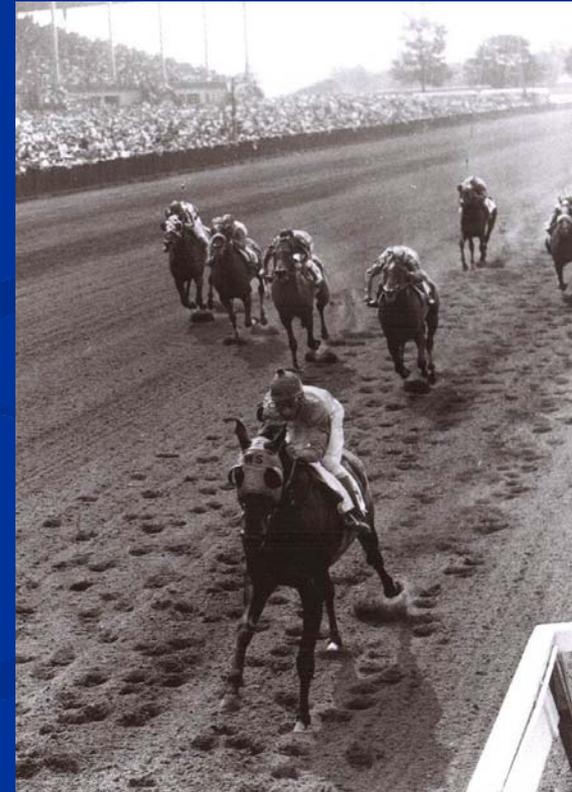
What is Needed?

- Clearing house for surfaces data
 - Reliable & consistent testing
 - Risk assessment data
 - Sharing of methods
- Understand regional needs
- Create a culture of data



Practice Not Research

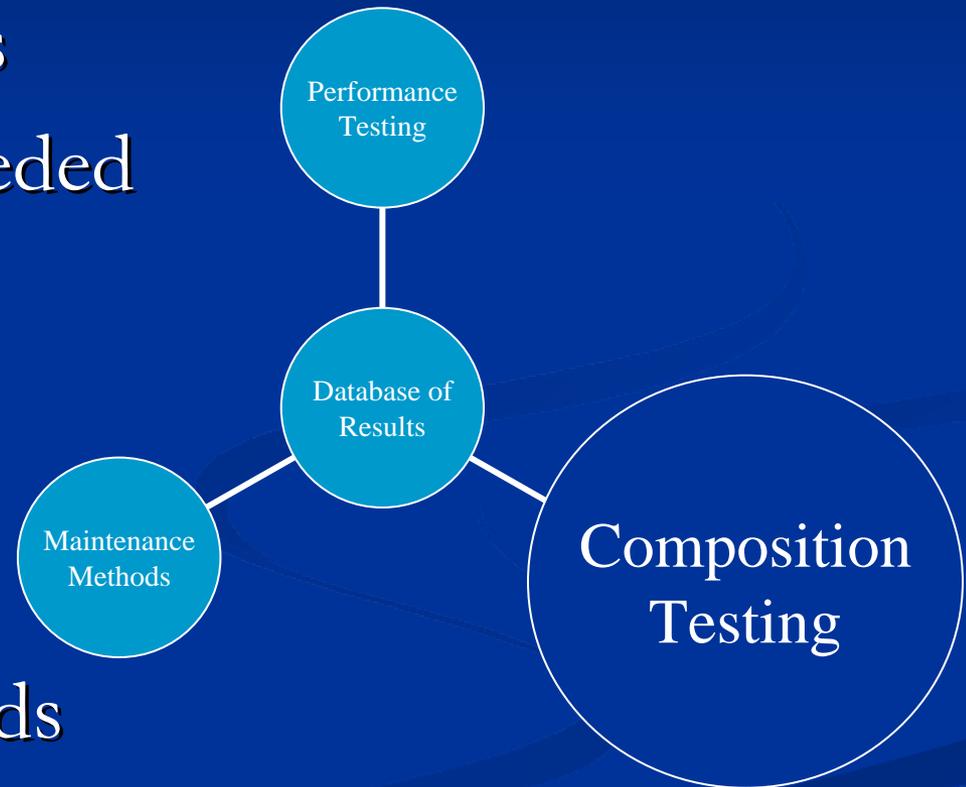
- Track Materials – Synthetic & Natural
 - Non-linear
 - More load the harder
 - Strain rate dependent
 - Synthetic creep
 - Dirt shows dynamic softening
- No easy or standard tests



Consistent Track Composition

- Consistent test methods
- New methods when needed
- Database of results for research

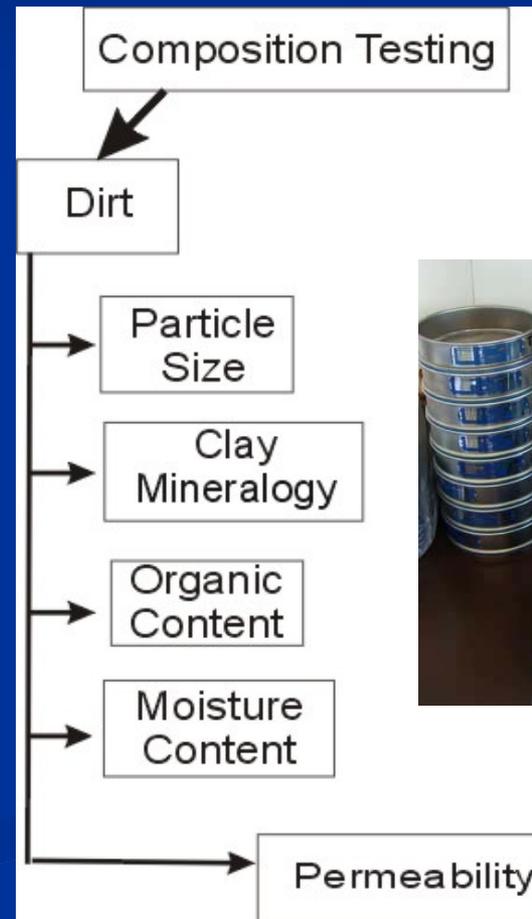
Open to all users:
Non-proprietary methods



A Single Reliable Lab for the Industry

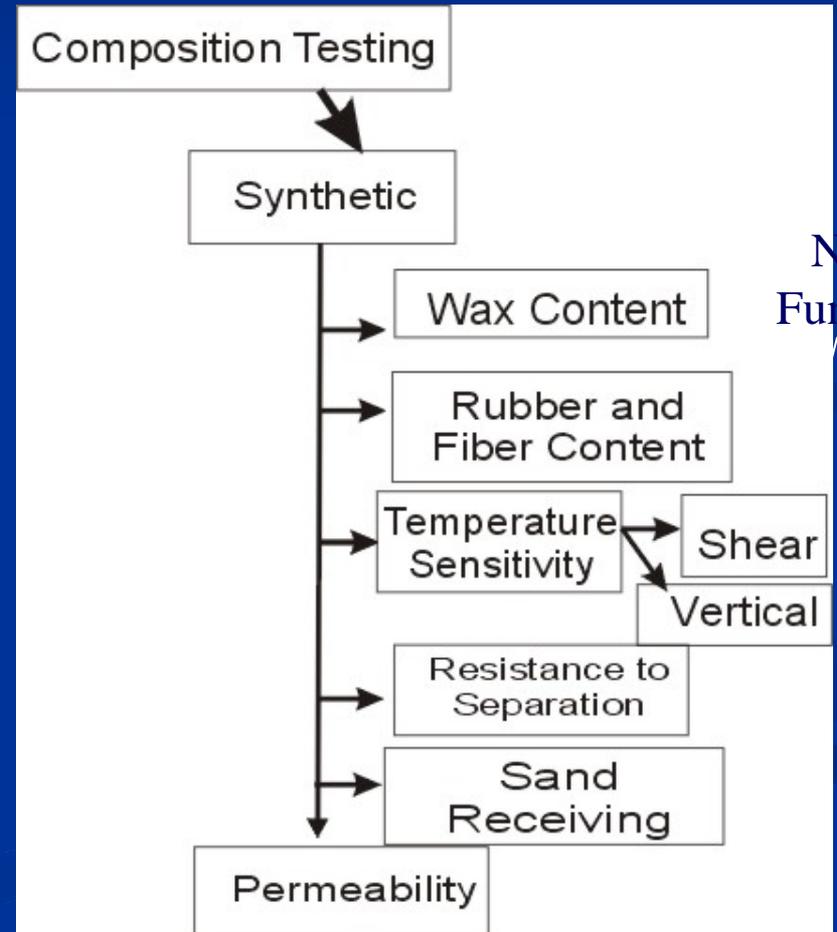
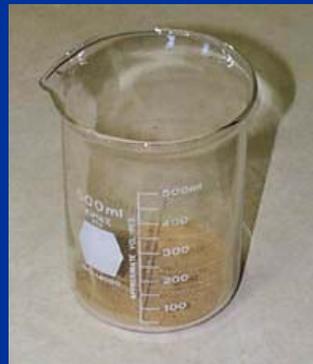
Measurement Methods: Dirt Composition

- Many tests for dirt established
 - Need comparative data
 - Not repeatable between labs
- Clay mineralogy - do particles stick together? (X-Ray Diffraction)
- Fiber weight percentage



Measurement Methods: Synthetic Composition

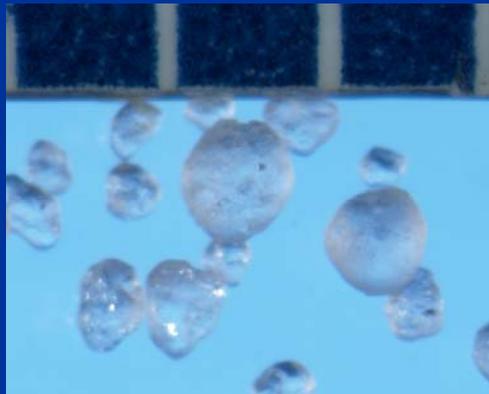
- Wax composition
- Temperature sensitivity



New
Funding

Implementation: Quality Control of Materials

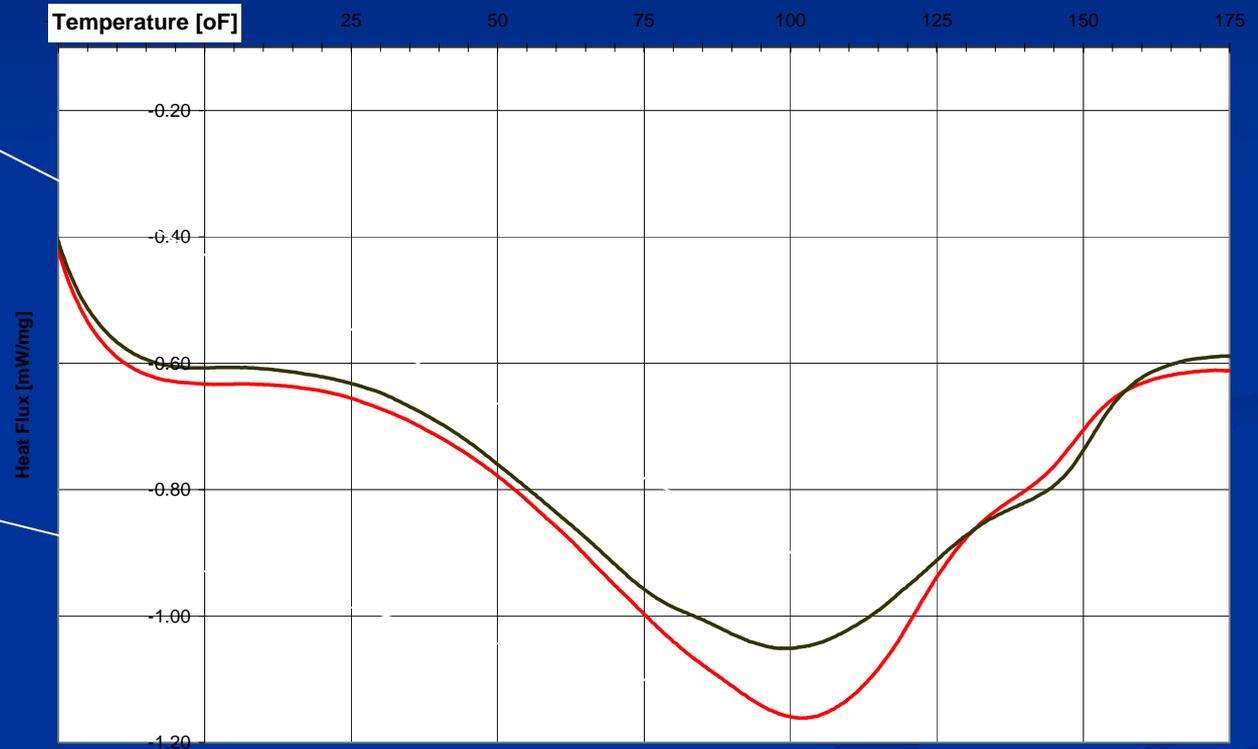
- Sand Matters...even in synthetic surfaces
 - Microscopy
 - XRD Mineralogy



Implementation: Wax DSC

Added wax

High temperature wax used initially



Differential Scanning Calorimetry from Added Wax

New wax reduces temperature sensitivity at critical 100-125° F

Laboratory for Analysis of Track Materials

- A central lab to compare between tracks
 - Consistent data
 - Current labs:
agriculture
civil engineering
 - Data for research
- Link to injury database
- Developing new tests of materials
- Coordinating high cost specialized testing XRD, DSC

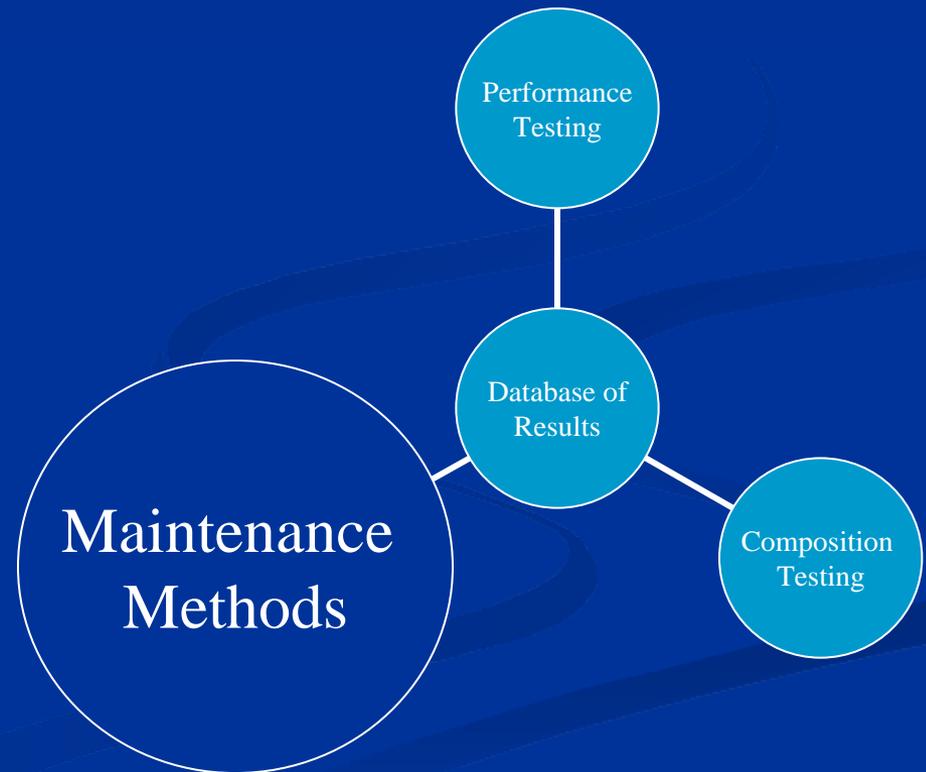


Central Track Surfaces Lab

- Modeled on drug testing labs:
But this is on the ground floor
- National facility:
Regional duplication only if needed
- Initial seed money:
 - Capital costs
 - Initial labor, training and “certification”
- Continuing funding
 - Initial investors, forms part of the board to determine research priorities
 - Tracks subscribe, standard package
 - Pay per test on added materials and as needed

Maintenance Matters

- Different tracks do things differently
- Justified reasons
 - Weather
 - Design
 - Usage
- Develop best practices



Maintenance & Condition Reporting System

Start simple,
research leads to expansion...

The model – start simple

On-Track Injury

...catastrophic,

then expand

Jeff Blea & Wayne McIlwraith

... other injuries



	Training	1st Post	Last Post	Precipitation	RT (Hours)	Depth	PH (Hours)	Depth	Water	Training	Out Riders	Racing
WE 1/27/07	Temp	Temp	Temp	Inches	RotoTill	RT	Power Harr	PH	(Gallons)	Eval	Eval	Eval
Sunday21	26	NA	NA	3" Snow	5Hrs	3"	2	3"	0	Deep	Snow	No Races
Monday22	35	NA	NA	Overcast	0	0	0	0	0	Good	Good	NA
Tuesday23	28	NA	NA	LightSnow	0	0	5HRS	3.5"	0	Good	Good	NA
Wednesday	30	28/18	25/12	1" Snow	5 Hrs	5"	0	0	0	Snow/Stichy	Deep	Good
Thursday25	26/9	26/13	19/6	LightSnow	0	0	4	3.5"	0	Outside Hard	Good	Good
Friday26	19	37	41	Sunny	4	4.5"	0	0	16,000	Little Hard	Good	Excellent
Saturday27	39	41	41	Overcast	0	0	0	0	20,000	Excellent	Good	

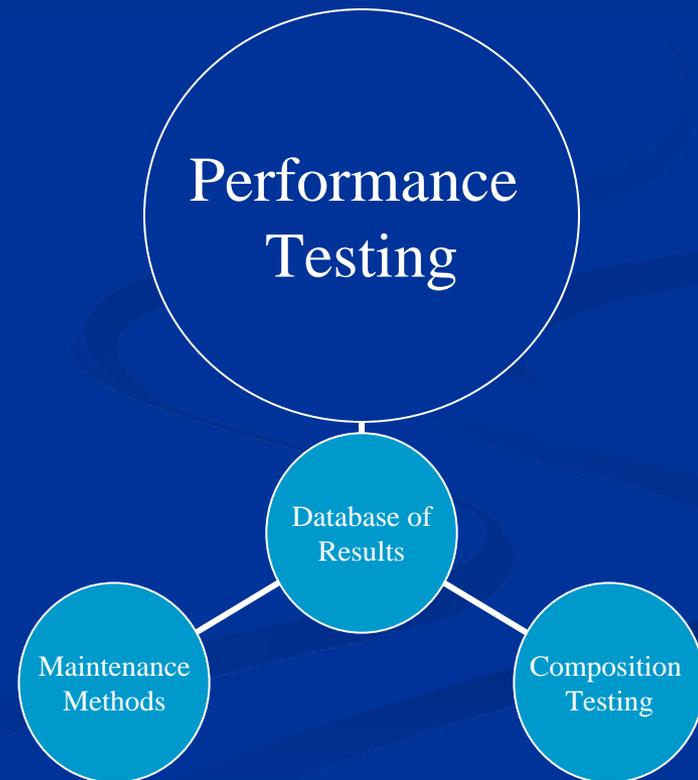
Maintenance & Condition Reporting System

- Weather data logging
 - Data logger for at standard location
 - Temperature, humidity, precipitation, wind, UV & visible light, evaporation rate and track temperatures
- Linked to maintenance reporting database (and handicapping?)



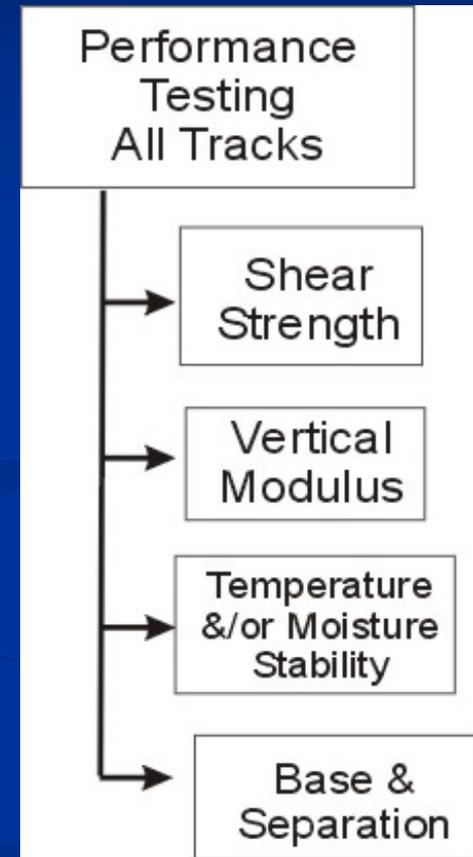
Performance Testing

- The perfect surface needs to perform in the real world
 - Temperature
 - Moisture
 - Maintenance
- Performance of the surface
 - Shear strength
 - Stiffness



Performance testing...

- On-site performance monitoring
 - Research must show that the measures relate to safety of the horse
 - Daily measurement of performance
 - Periodic measurement of composition

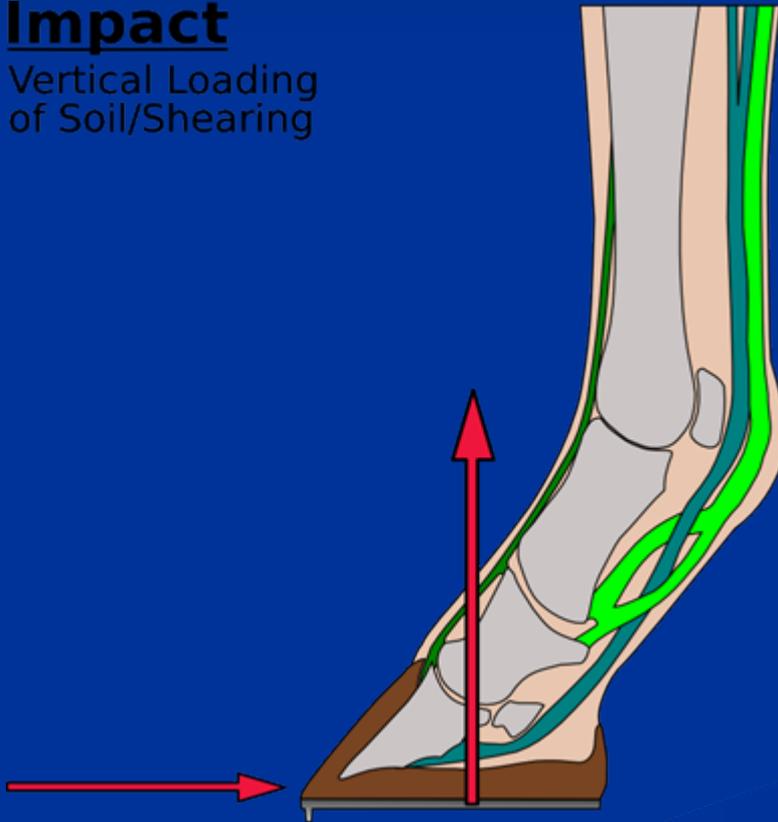


Do the research and determine which factors pose a risk

Surface has different function during phases of gait: Impact/loading

Impact

Vertical Loading
of Soil/Shearing

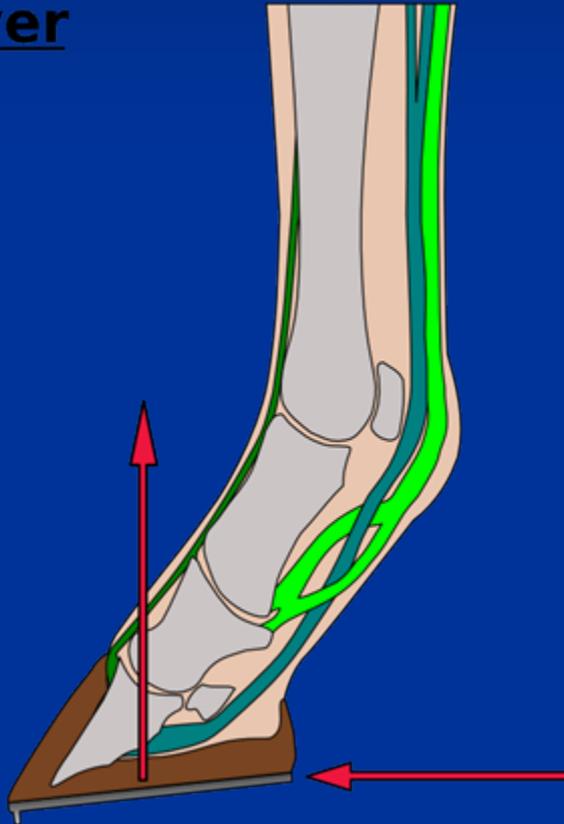


- Lower vertical modulus reduces strain rate and peak loads
- Shear failure reduces horizontal peak accelerations

Surface has different function : Breakover/Propulsion

Break-Over

Unloading with
Shear



- Shear strength to support hoof during propulsion
- Control hoof rotation during turn

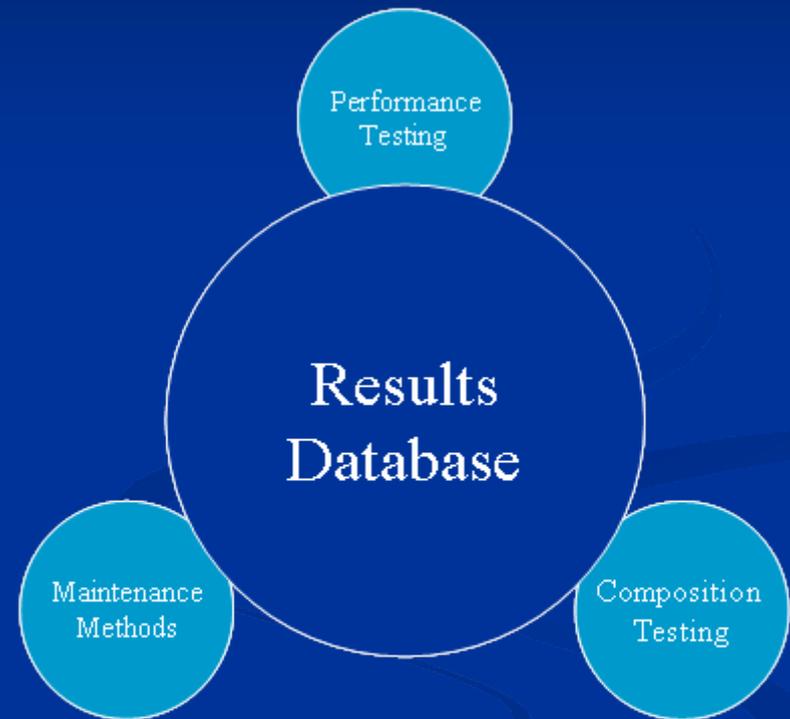
Biomechanical Hoof Tester

- Biomechanical Hoof Tester
 - Started in 1998, testing in 2004
 - Comparison of 26 tracks and 6 Synthetic Tracks
- During breaks (40 min)
- Simultaneously measure shear and hardness



Centralize Results for Research

- Central data repository
 - Maintenance methods
 - Performance testing
 - Track composition
- Data can be tied to outcomes
- Learn as methods evolve



Funding to get to this Stage

- Initial funding: AQHA Racing
- Second year of funding: Oak Tree, Del Mar, Fairplex, CARF, Santa Anita, Hollywood, TOC
- Funding from Dolly Green, Southern California Equine Foundation and Oak Tree
- Pay for services from tracks since 2005
- Current research grant Grayson-Jockey Club
- Need a mechanism to implement the research

Laboratory Anticipated Cost and Revenue Model

- Not expected to be self supporting until fourth year,
 - Depends on number of participating tracks
 - Total capital costs: \$178,500
 - Total labor costs (first three years): \$205,000
- Capital costs primarily year 1 and 2
- Labor expenses growth through year 3
- After capital costs:
 - 20 tracks to support operation

Track Testing Machine

- Cost of first machine
 - Requires additional design engineering
 - Primary cost is “end user” software
 - Significant on-site support for initial tests
 - First machine, \$208,000
- Machine 2 through 5
 - Continuing improvement in machine software
 - Real time database link
 - Significant fabrication savings
 - Overall cost 22% lower



Philosophy

- Need to provide a common set of measures
- Measures based on:
 - Biomechanics
 - Procedures
 - Consistent track material
- Support research:
 - What surfaces are safe?
 - When are they unsafe (climate, composition?)
- Provide tools & lab support to evaluate materials

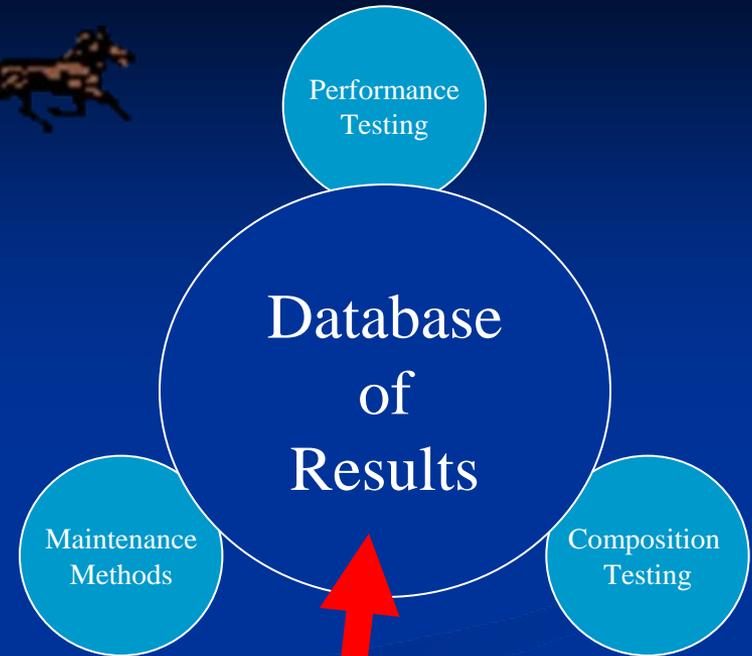


Acknowledgements



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- Continued research funding: Grayson Jockey Club Research Foundation, Polytrack, Del Mar, Keeneland, Santa Anita, CARF, TOC, Fairplex, Dolly Green Foundation, Oak Tree Racing Association





*The remaining question:
Epidemiology?*

It only matters if we help horses and riders

Need Correlative Epidemiologic Data

- Non fatal musculoskeletal injury is also important
- Welfare and Safety Summit On-Track Injury Statistics (Dr Mary Scollay):
 - Fatality rate 2.03/1000 starts on dirt tracks
 - Fatality rate 1.47/1000 starts on synthetic surfaces

Proposed Epidemiologic Study on Non-Catastrophic Injuries in Thoroughbreds in Southern California

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SOUTHERN CALIFORNIA EQUINE FOUNDATION, INC.



Santa Anita

Hollywood Park

Del Mar

"A Charitable Corp. Dedicated to the Care of the Injured Horse"



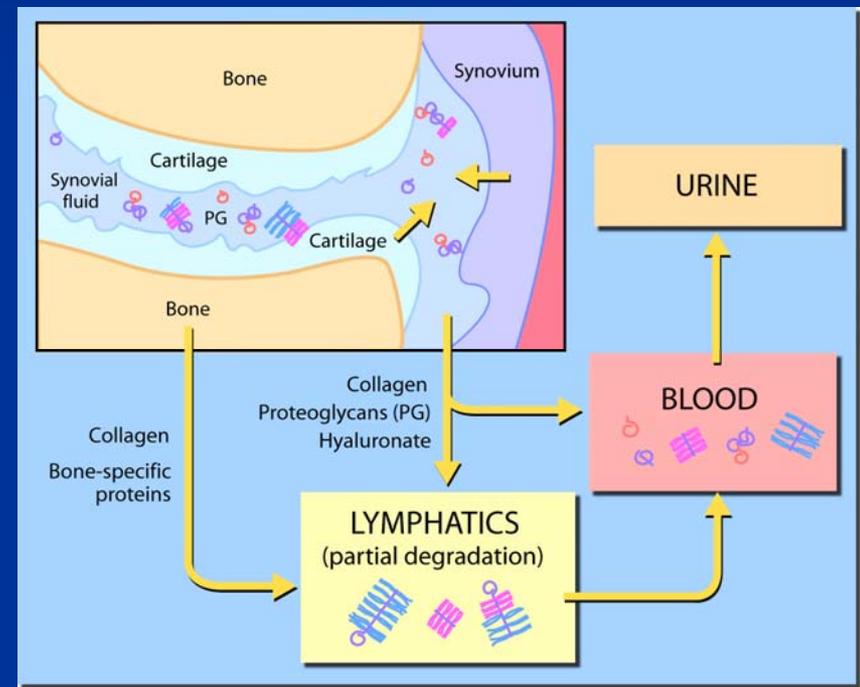
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RESEARCH CENTER**
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Summary of Pilot Study

- Decrease in arthroscopic surgeries & condylar fracture repairs in 2007
- Baseline data on non-catastrophic injury incidence
- Specific incidence at Del Mar 2007
- Decreased incidence of injury at Del Mar in 2007 based on radiographs
- No increase in soft tissue injuries on synthetic tracks

We need to consider the other factors!

- Fragility/Durability
- Conformation & Shoeing
- Medication
- Soundness
- Lameness - Diagnostics
- Not lame but with subchondral microdamage - serum biomarkers to identify horses at risk - imaging



Thank You

