

trackman
baseball



Know Your Stuff™

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An Introduction to TrackMan Baseball SABR40

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Where is Denmark?



Objectives

- Introduce TrackMan as a company and technology
- Review what is unique about TrackMan Baseball
 - Actionable
 - Scalable
- Describe how you can get involved with the TrackMan team



2003

- Incorporated in May 2003 in Denmark, focus on golf
- 4 founders, 2 active in the company today
 - CEO Klaus Eldrup-Jørgensen
 - CTO Fredrik Tuxen
- Company started in Klaus' garage with Fredrik and a handful of engineers

2004

- TrackMan Pro first demoed to customers in late 2004 – 5 demos to equipment manufacturers, 5 sales

2005-
2007

- The data accuracy and product quality quickly led to focus on equipment manufacturers, the USGA, and the R&A
- TrackMan became the de facto industry standard
- PGA TOUR agreement signed in 2006
- First broadcasting deals: ESPN, ABC, Golf Channel, BBC, NHK

2008+

- TrackMan expands into other sports
 - Baseball
 - Cricket
 - Soccer



TrackMan: The Technology

- Military-grade Doppler radar measurement system
- Sample rate of 48,000 measurements per second
- Precisely measures the location, spin, angles, velocity and trajectory of a ball in flight
- Radar sits high behind home plate
- Operator used computer attached or networked to radar to tag game results



TrackMan Baseball is unique in that data are actionable and technology is scalable

Actionable: measures not only end results of pitches and hits, but also “why” those results happened

- TrackMan can measure things no one else does, particularly at “moments of truth” (pitch release, hit impact)
- Allows teams to answer the question: “what is coachable, and what do we need to scout for?”

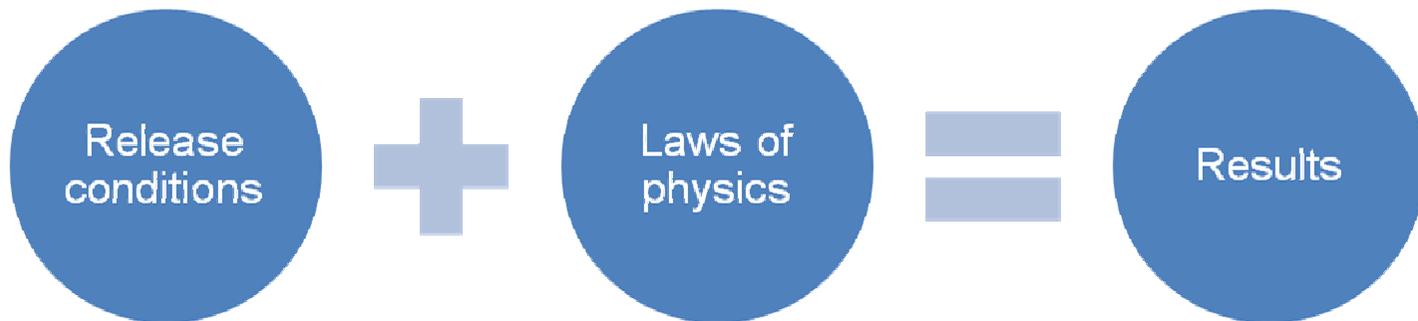
Scalable: capture data at all levels of play

- MLB
- MiLB
- Universities
- International
- Showcases
- Academies
- High schools



Actionable: TrackMan *measures* both “what” happened and “why” it happened (The Pitch)

The pitch



- 3D Release slot (height, side, distance from home)
- Speed at release
- Release angle
- Spin rate
- Spin axis

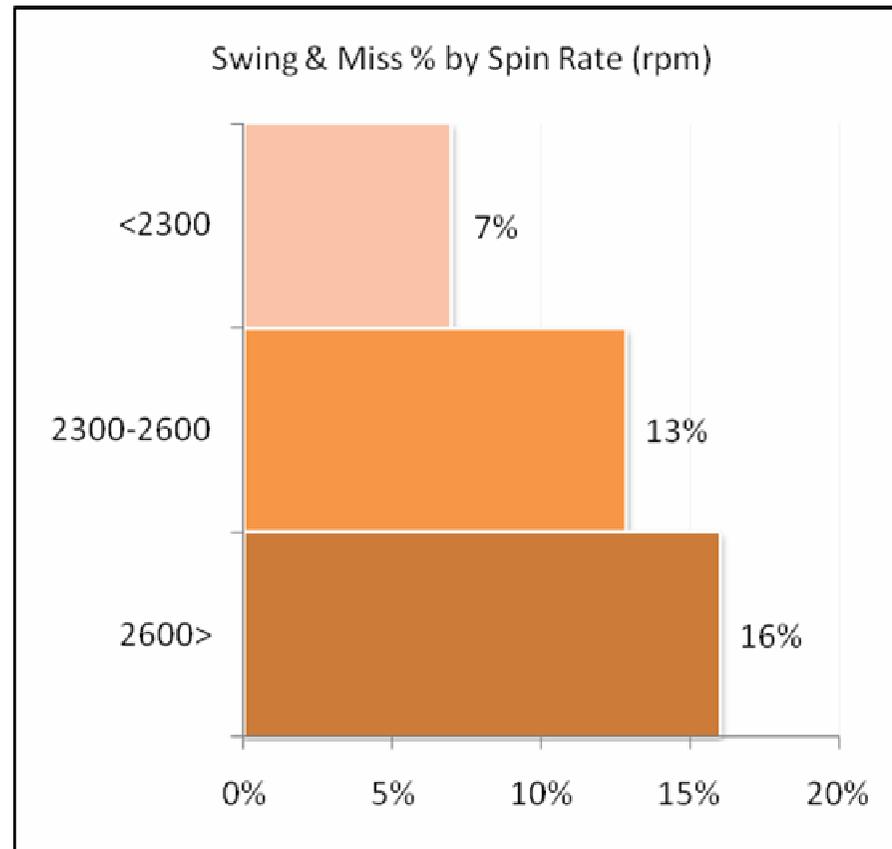
“Why it happened”

- Movement (horizontal break, vertical break)
- Plate location
- Plate approach angles (horizontal, vertical)
- Time of pitch flight
- Speed at plate

“What happened”



Analysis shows high spin rates on curveballs lead to more swing and misses



Measuring "Stuff"



But spin is not helpful if it is in the wrong direction...

One team found a Rookie Ball position player who is being converted to pitcher that is capable of generating spin well above the MLB average.

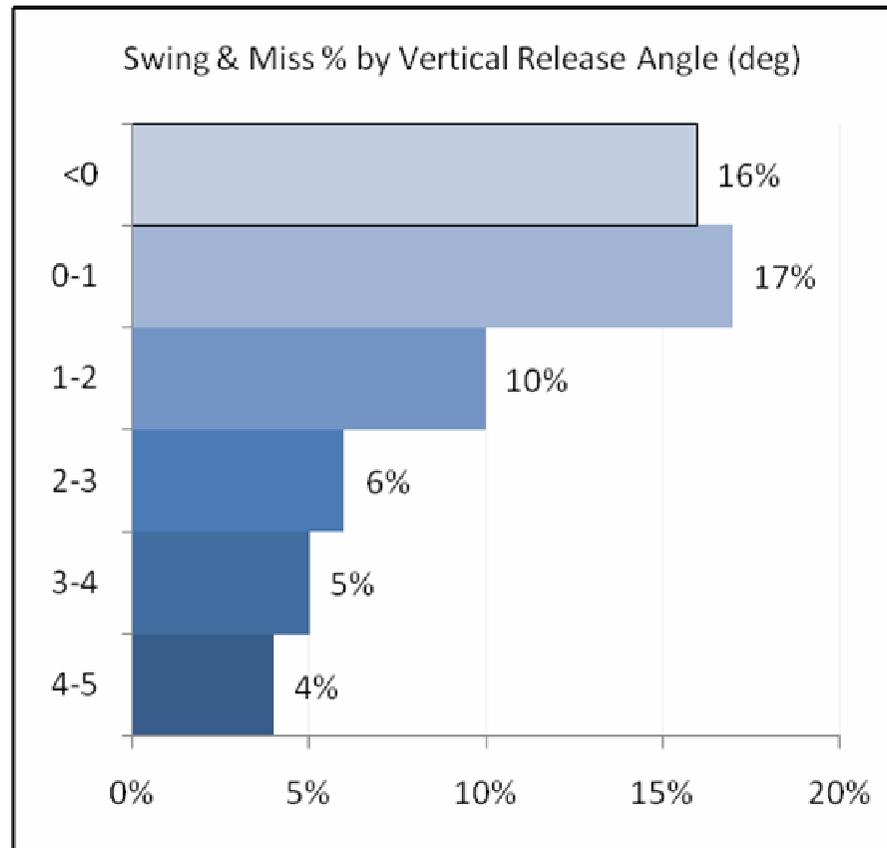
	Average spin rate (rpm)
MLB Curveball	2,450
This Rookie Ball pitcher's Curveball	2,750

But this Rookie Ball player that he is not throwing with the proper tilt to get the desired break on his curveball.

	Spin direction (RHP)
Typical MLB Curveball	Spinning toward 7:00-8:00
This Rookie Ball pitcher's Curveball	Spinning toward 2:45



Analysis shows low launch angles on curveballs lead to more swing and misses

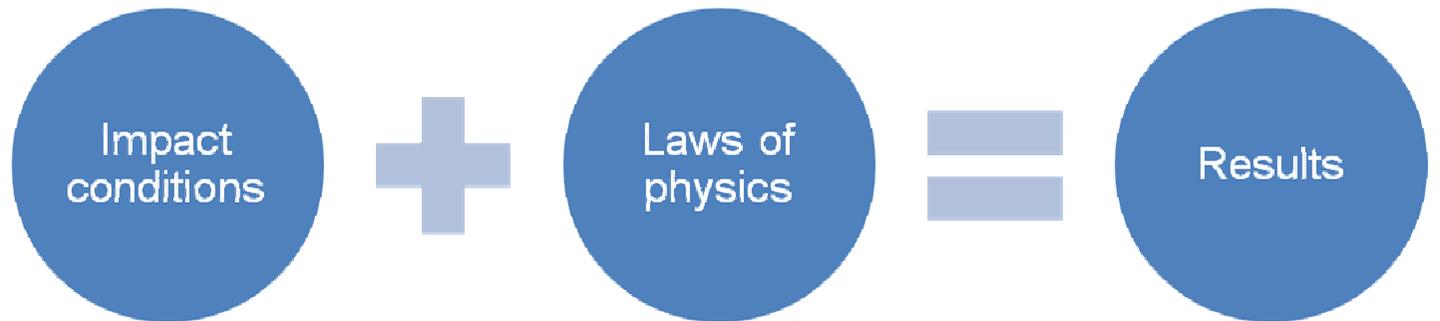


Measuring “Deception”



Actionable: TrackMan *measures* both “what” happened and “why” it happened (The Hit)

The hit



- Exit speed of hit
- Exit angles of hit (horizontal, vertical)
- Spin rate of hit
- 3D contact position of impact*
- Spin axis of hit*

“Why it happened”

- Carry distance
- Landing position
- Maximum height
- Time of hit flight

“What happened”

* Technically feasible, but not currently available



Slugging Percentage varies significantly by Hit Vertical Launch Angle and Exit Speed

	Exit Speed (mph)							
Hit Launch Angle (deg)	<75	75-80	80-85	85-90	90-95	95-100	100-105	105>
<0	.100	.146	.281	.228	.322	.333	.587	.500
0-5	.273	.267	.393	.371	.592	.663	.682	.636
5-10	.245	.469	.643	.679	.771	.720	1.017	1.125
10-15	.415	.593	1.042	1.020	.987	1.000	1.074	1.250
15-20	.737	1.083	.805	.750	.552	.835	1.580	2.235
20-25	.824	.429	.375	.405	.730	.977	2.877	3.500
25-30	.525	.040	.000	.279	.789	1.920	3.417	4.000
30-35	.528	.000	.069	.241	.538	1.638	3.000	
35-40	.200	.000	.085	.213	.700	1.445	1.714	4.000
40-45	.310	.000	.000	.229	.188	.667	.000	
45>	.250	.054	.000	.018	.000	.500	.000	

Not Well Hit

Well Hit

Very Well Hit

Chart based on 4,011 balls in play.



This Hitting Analysis can help MLB clubs with both pitching and hitting considerations

- **Pitching performance evaluation.** Was the pitcher “unlucky” because several not well hit balls landed for hits, or was he roughed up by giving up too many very well hit balls?
- **Pitching coaching.** Which pitches in the pitcher’s repertoire tend to be well hit? Which ones tend to be not well hit? How can the pitcher make changes to his pitch selection to improve results? Can weaker pitches be improved so they are not as prone to being well hit?
- **Hitting scouting.** Can a player generate the necessary exit speed to be a power hitter?
- **Hitting performance evaluation.** Has a hitter lost a few MPH of exit speed or has he just hitting the ball at people?
- **Hitting coaching.** If the player cannot generate exit speed, what would be the ideal launch angle to maximize performance?



Scalability: Multiple versions of the hardware allow teams to collect and compare performance across levels of play

TrackMan Stadium Radar

- Semi-permanent installation
- Radar tracks pitched and hit balls
- Operator tags situation and results
- Data output - .CSV and graphic reports
- Proprietary online database contains all data and reports
- Realtime data available for other purposes

TrackMan Portable Radar

- Same measurements and reports as stadium radar
- Designed for use in smaller venues and backfields
- Provides realtime feedback for training



Where can I get my hands on this data?

- TrackMan data is proprietary to its customers – so it is not possible for the general public to get access to it
- However, TrackMan has started the TrackMan Baseball Insights Lab, managed by Josh Orenstein (jko@trackman.dk)
- To get involved: email Josh your ideas for how TrackMan Baseball can add value to the baseball community
- If your idea is unique and useful, we will give you credit in our discussions with customers and/or potentially hire you on a project-basis
- Legal disclaimer: All ideas are submitted voluntarily and TrackMan may choose to use at its discretion without remuneration to the submitter



Thank you for your time

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