
Your Athlete Swing Profile

Jun 30, 2019 - Nov 09, 2020

A Driveline EDGE product designed to generate insights from a player's DIAMONDKINETICS data. Use the DK-model 'Damage Potential' metrics included in Swing Profile to give a hitter an idea of his or her batted ball profile from a pure swing analysis. Use the tabular and distributional visualization data split out across a multitude of playing levels and all collected in high intensity situations from live pitch to facing the pitching machine to give perspective to your own individual metrics. Note that for DK data, selecting Indy as an intended playing level for comparison will match to College D1 and College will match to College Other. Use the accompanying text and outside resources to increase education and swing tracking knowledge.



Performance Summary

A set of player averages from the specific imported player data versus five playing level averages of all qualified hitters. Conditional green and red shades are applied to the barrel speed, speed efficiency, trigger to impact and attack angle averages as well as the damage potential batted ball metrics based on the imported player being either 0.5 std devs above (green) or below (red) the selected playing level averages (in this case the level selected was: college other)!. Additional definitions to note for these metrics -- Sweet Spot is measured at 20% from the tip of the bat, and is used in most DK calculations revolving around barrel speed and attack angle. The attack angle is measured over the 5 sample frames right before impact. The trigger, or beginning of swing, is measured when the hitter reaches 10% of the max acceleration reached during the whole swing.

Key Metrics

	Description	Your Athlete	Affiliate	College D1	College Other	HS	Youth
Avg BarrelSpeed	The average of the hitter's barrel speed, from the sweet spot	59.81 +/-7.3	61.75 +/-7.3	59.17 +/-9.2	58.64 +/-6.9	54.67 +/-5.7	42.82 +/-5.0
90th% BarrelSpeed	The 90th percentile of the hitter's barrel speed values	67.58	70.13	68.18	67.38	62.34	49.89
PotentialVelo	The average of the DK-calculated maximum exit velocity possible from flush contact	78.67 +/-11.4	92.57 +/-13.9	87.46 +/-17.7	86.1 +/-13.1	82.53 +/-11.4	61.32 +/-9.3
PotentialDistance	The average of the DK-calculated maximum distance possible from flush contact, calculated across all possible exit conditions	196.85 +/-60.7	239.37 +/-70.2	218.41 +/-79.0	221.09 +/-67.5	209.63 +/-61.3	141.89 +/-41.4
Avg SpeedEfficiency	The % of the max barrel speed achieved at impact	99.55 +/-2.5	99.94 +/-0.1	99.93 +/-0.1	99.94 +/-0.1	99.94 +/-0.1	99.95 +/-0.1
Avg TriggerToImpact	The average of the hitter's time between trigger of the swing to impact --measured in milliseconds	175.381 +/-22.2	181.25 +/-19.4	180.0 +/-21.9	181.25 +/-20.4	186.56 +/-20.6	213.93 +/-31.3
Avg AttackAngle	The average of the hitter's attack angle values	4.99 +/-13.7	4.26 +/-11.8	4.91 +/-11.6	4.21 +/-11.4	5.29 +/-11.4	6.73 +/-11.6
Attack Angle Range	The proportion of swings where attack angle is between 4 and 16°	36.02	35.0	35.0	35.0	40.0	40.0
Avg MaxHandSpeed	The average of the hitter's peak hand speed values -- the hands are measured as being 2" up from the knob of the bat	21.63 +/-2.8	21.99 +/-2.8	21.06 +/-3.4	21.21 +/-2.7	20.32 +/-2.6	16.13 +/-2.5



Performance Summary

A set of player averages from the specific imported player data versus five playing level averages of all qualified hitters. These metrics are not compared conditionally to the other playing levels so none will have green or red respective shadings. An additional definition to note for this page is that "In The Zone" is measured as the time period from when the bat is perpendicular to 1st Base through 3rd base for a RHH, and the reverse for a LHH.

Supplementary Metrics

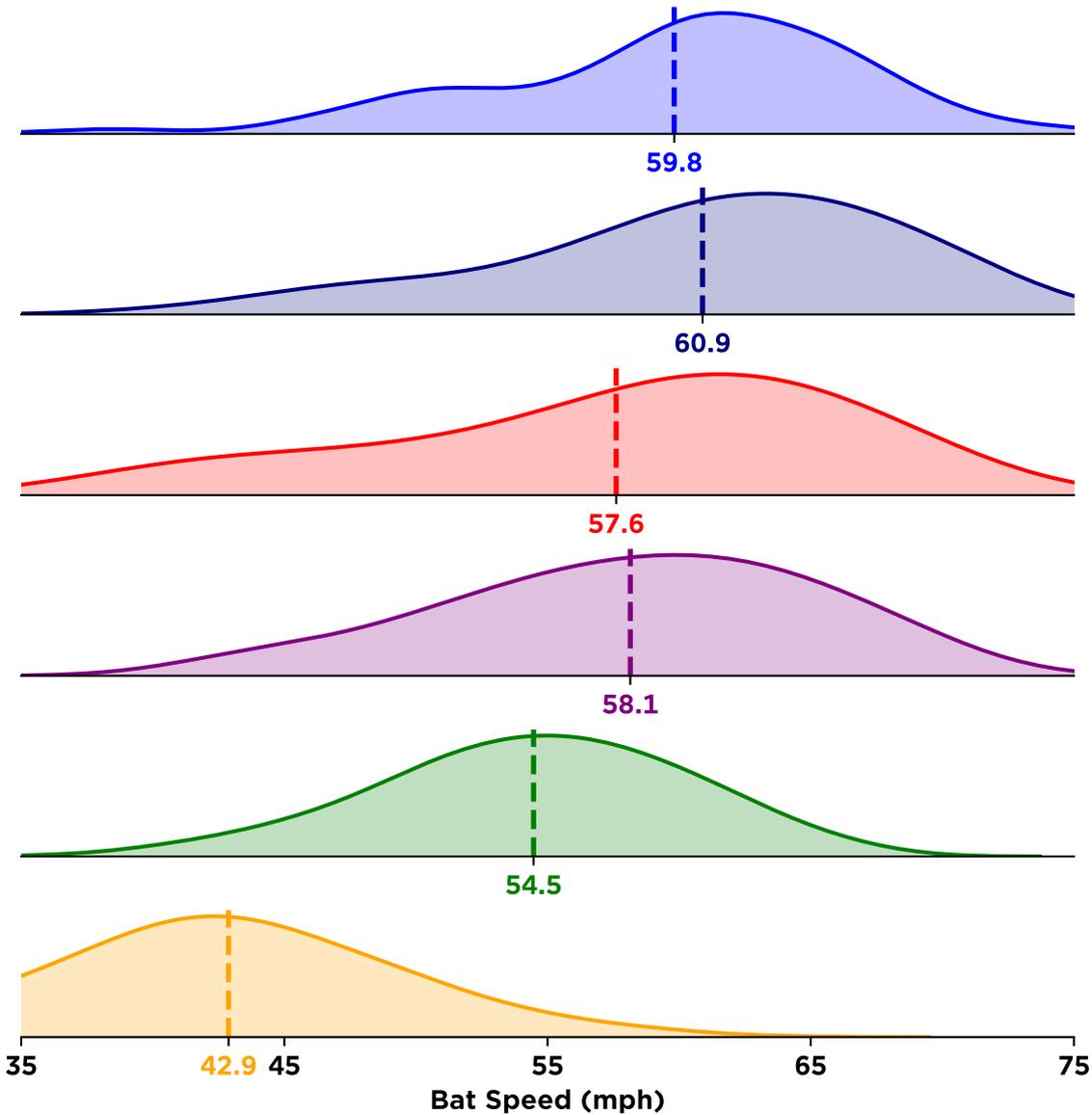
	Description	Your Athlete	Affiliate	College D1	College Other	HS	Youth
Avg AppliedSwingPower	The average of the hitter's power values (measured in watts) off a precise moment of inertia	916.93 +/-232.6	943.62 +/-298.6	864.13 +/-360.3	839.47 +/-259.5	690.67 +/-197.7	290.24 +/-106.4
Avg MaxAccel	The avg of the max (gravitational) acceleration achieved during --rotational acceleration is not incorporated in this figure	32.98 +/-8.7	29.74 +/-8.2	27.51 +/-7.8	26.36 +/-5.9	24.63 +/-5.5	16.79 +/-3.7
Avg ImpactMomentum	The average of the momentum of the bat at impact the swing	22.54 +/-2.8	23.46 +/-3.9	22.05 +/-4.6	21.92 +/-2.9	20.12 +/-2.6	11.92 +/-2.3
Avg HandCast	The average of the max horizontal distance that the hands travel away from the body during a swing	11.48 +/-6.8	11.96 +/-6.9	12.24 +/-7.2	12.65 +/-7.0	12.74 +/-7.3	13.67 +/-7.5
Avg DistanceInTheZone	The avg of the linear distance the sweet spot of the barrel travels out while still 'In The Zone'	32.4 +/-3.4	33.44 +/-3.8	32.87 +/-3.8	33.27 +/-3.4	32.29 +/-3.4	29.58 +/-3.7
Avg/Max BatSpeed	The proportion of a hitter's average bat speed to their max bat speed recorded during the session	70.53	90.0	89.0	89.0	90.0	88.0
# of Swings	The # of swings recorded in a hitter's session as well as the floor # of swings per athlete pool from DK database	533	10000	10000	10000	10000	10000

Performance Detail

Bat Speed

A density plot distribution of the hitter's bat speed values against DK database hitter averages, split out by playing levels.

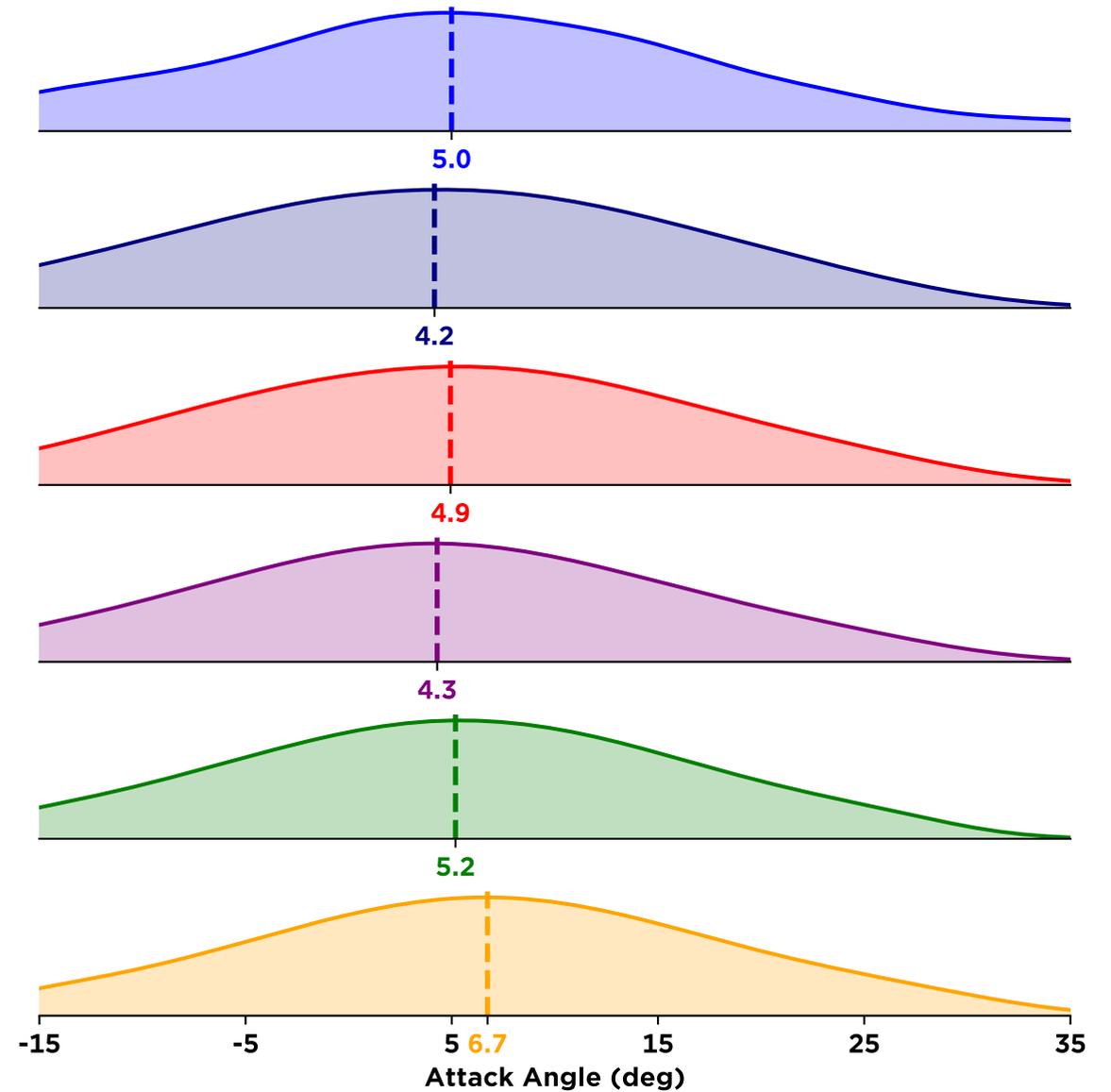
Your Athlete



Attack Angle

A density plot distribution of the hitter's attack angle values against DK database hitter averages, split out by playing levels.

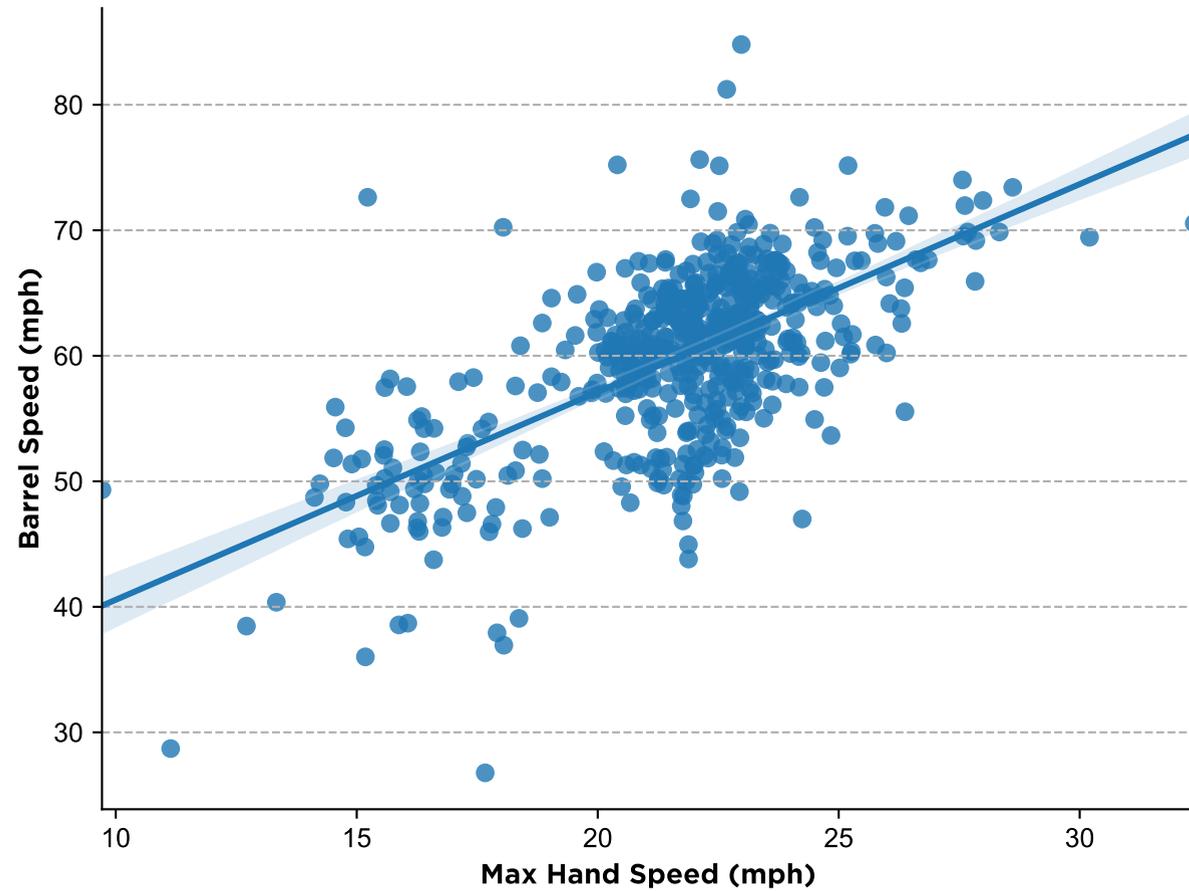
Your Athlete



Performance Detail

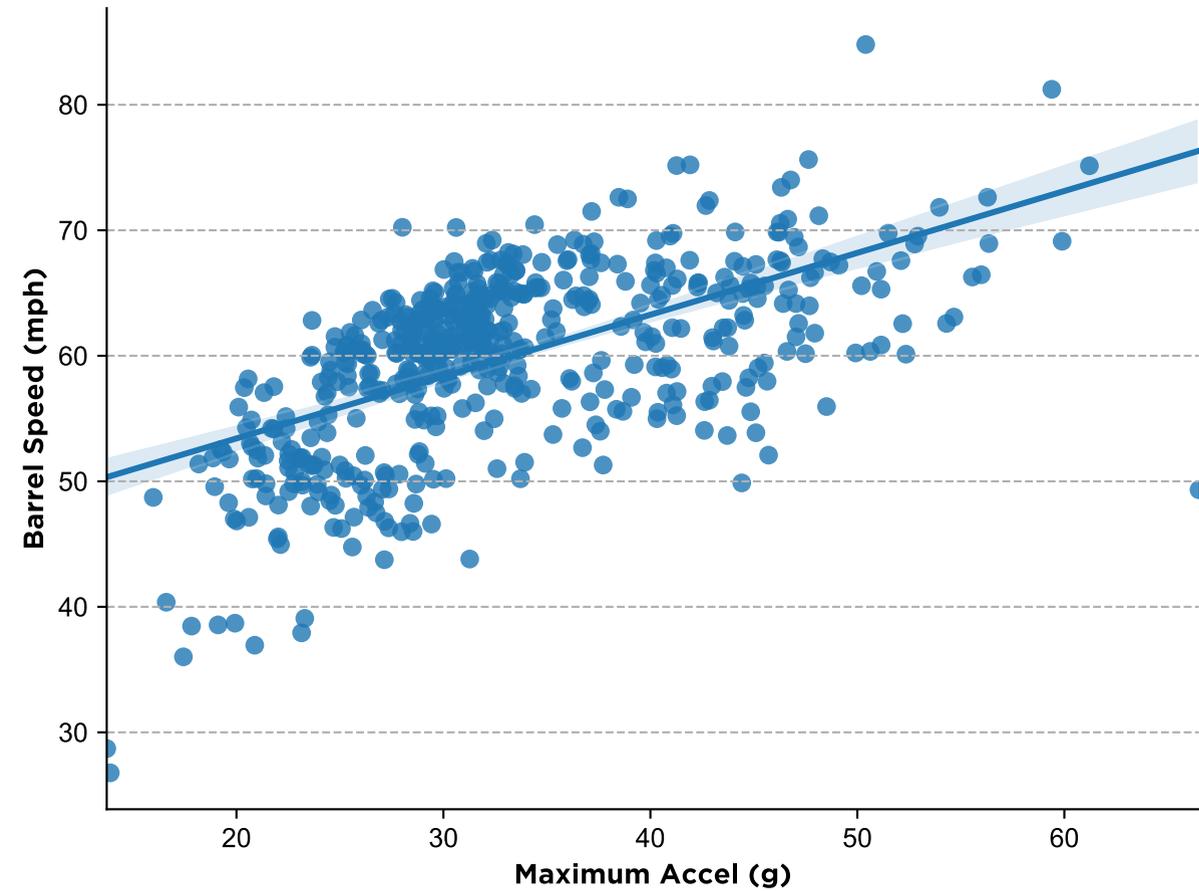
Barrel Efficiency

A linear model of best fit with 95% shaded confidence intervals plotted between max hand speed and barrel speed



Acceleration Efficiency

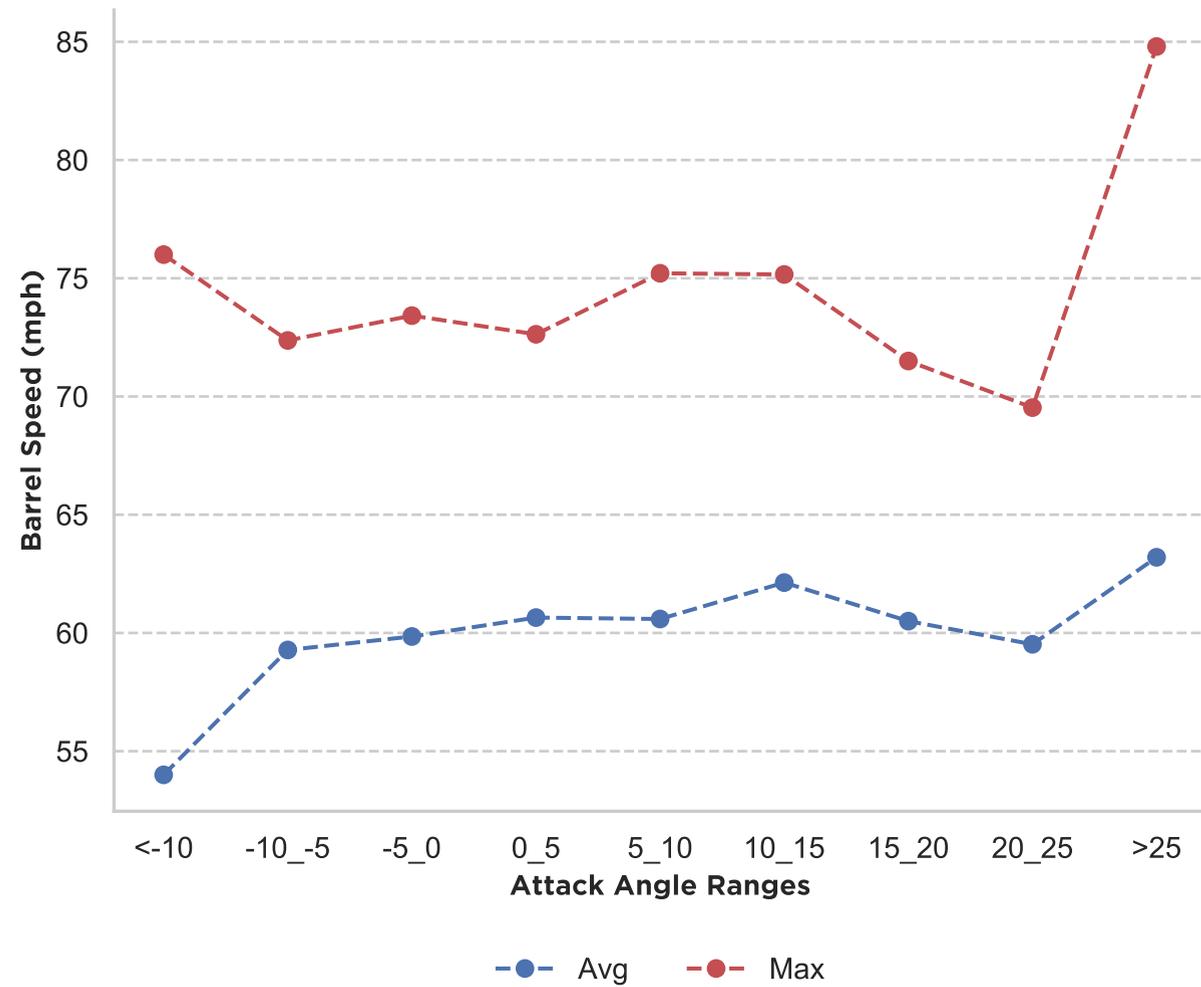
A linear model of best fit with 95% shaded confidence intervals plotted between maximum acceleration and barrel speed



Performance Detail

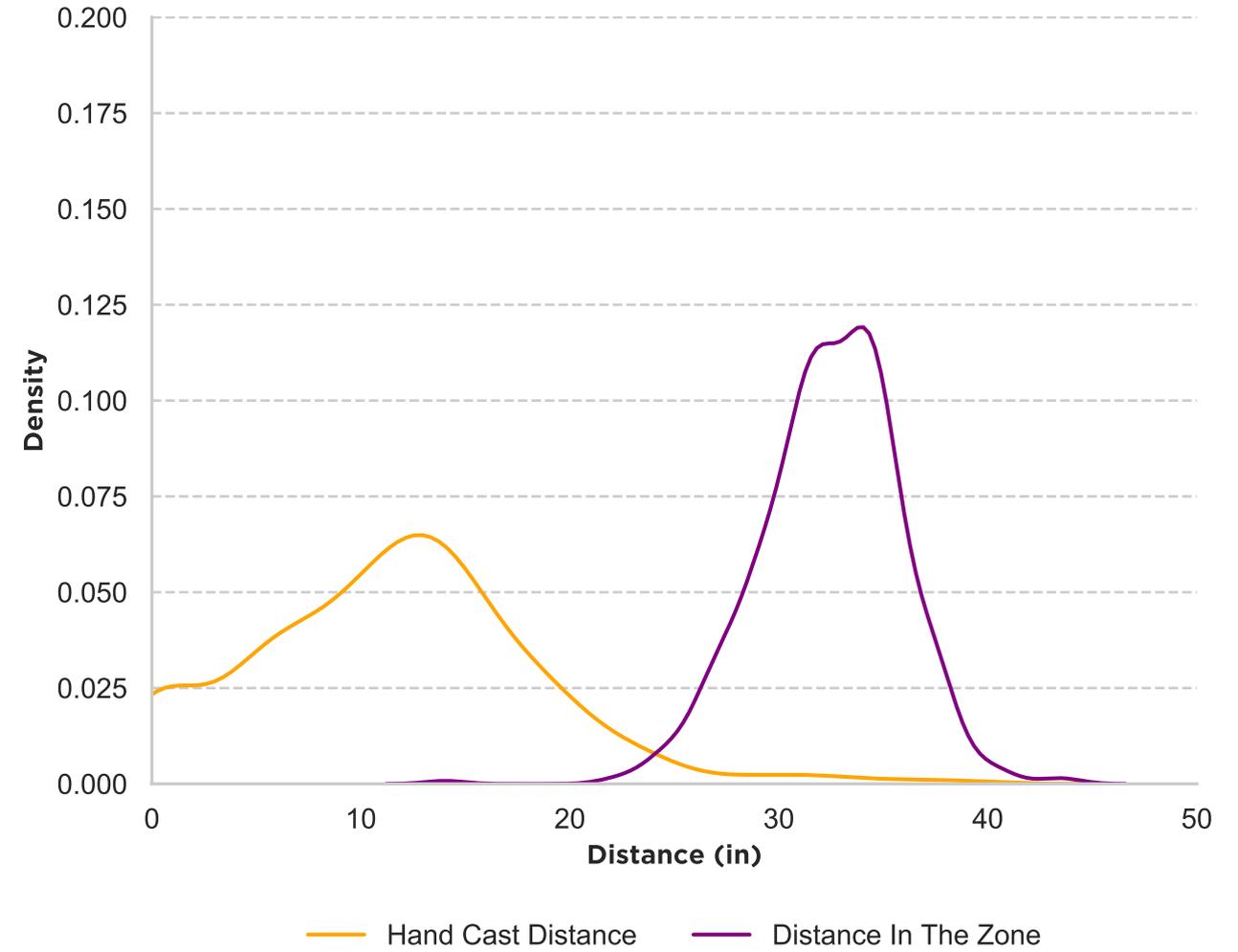
Avg/Max Barrel Speed by Attack Angle

Average barrel speed plotted by attack angle ranges. If there is no swing level data for any one of these ranges, it will not be plotted.



Control Distributions

Density plot distributions of the hitter's Hand Cast Distance and Distance in the Zone lengths (in inches)



Continuing Education

Swing Profile: Introducing Expected Batted Ball Results

Knowing that bat sensor data is both reliable and often very descriptive of a hitter's batted ball talent, we decided to build a more powerful report, termed here as Swing Profile, based on *only* swing characteristics... the report also features two new predicted batted ball metrics: Peak Exit Velocity and Launch Angle at Peak Exit Velocity. In this case, we use Peak EV to reference the average EV of an individual's top eighth hardest hit balls, a proxy for exit velocity that has been used for years by the sabermetric community and has been validated by Driveline's own findings.

Learn More: <https://rb.gy/4tedu7>

Driveline Hitting KPI's

...at Driveline, we have a little bit more data to use, as our concerted data collection efforts on the hitting floor have allowed us to pair tens of thousands of rows of Blast and HitTrax data by their timestamps and users, allowing us now to put a concrete bat speed figure with batted ball data. Regressing completely off this we have found a simple linear regression explaining around 80 percent of the variation (or $.8 R^2$) of bat speed.

Learn More: <https://rb.gy/s9j5tp>

Debunking Bat Speed Myths

With the ability to measure bat speed and pair the findings to launch monitors and 3D motion devices, the claims on the relationship between bat speed and batted-ball characteristics can finally be examined. These are the ways to produce higher exit speeds:
--increase the speed of the most distal segment (the bat)
--decrease vibration on contact (sweet spot)
--increase the speed at which the ball is pitched

Learn More: <https://rb.gy/erjuxv>

Pairing Blast and Hittrax Data

Exit velocity increases (in order of strength) with Blast's power metric, bat speed, peak-hand speed, and the rotation metrics, while decreasing with time to contact. Launch angle has a positive significant correlation with attack angle which, while completely different metrics, are often either confused for one another or believed to not be correlated at all.

Learn More: <https://rb.gy/mwm721>

Pairing Blast and Hittrax Data Part II: Specific Focuses

In this piece, we take a look at commonly held, specific beliefs that have been touched upon by our hitting trainers and see whether the data backs it up. We also take a more nuanced view of a popular sabermetric proxy for evaluating attack angle via unsupervised learning.

Learn More: <https://rb.gy/qmj2um>

Rotational Acceleration, Sequencing, and the Swing

Our R&D team has paired Blast, K-Vest, and HitTrax data, allowing us to take a deeper dive into rotational acceleration to evaluate claims surrounding it. We have found relevant correlations with sequence percentage, time to contact, and peak hand speed.

Learn More: <https://rb.gy/j4mmkr>