# Pitching Snapshot

**Jul 17, 2022 - Aug 16, 2022**

Generate insights from pitching tracking tech input. Get an idea of where a certain pitcher lies in a distribution of his pitch type physics (velocity and spin) across four playing levels: Affiliate, Independent, College, and High School. This report will give you tabular and visual representations of your data, and allow you to compare against different playing levels of pitcher (percentile and quartile rankings will always be designed to have the higher values be represented by the 99th percentile and the 1st quartile). Automatically generated text insights from our trainers, along with goal recommendations and accompanying continued education links will give you an idea of where you lie as a pitcher and how to continue to educate yourself with available resources. This report is based on data from: Trackman Baseball

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# Performance Summary

## Pitch Metrics

| | ChangeUp | Curveball | Fastball | Slider | Undefined |
|---|---|---|---|---|---|
| **Total Pitches** | 6 | 8 | 13 | 1 | 4 |
| **Velocity** | 75.9<br>(78.3) | 72.7<br>(74.3) | 83.9<br>(86.9) | 74.4<br>(74.4) | 84.9<br>(85.2) |
| **Spin Direction** | 01:52 | 07:58 | 12:57 | 09:40 | 01:04 |
| **Spin Rate** | 1839<br>+/-99 | 2318<br>+/-77 | 2220<br>+/-64 | 2206<br>+/-0 | 2228<br>+/-26 |
| **Spin Efficiency** | 92.9 | 33.7 | 97.6 | 54.8 | 99.3 |
| **Gyro Degree** | 17.1 | 70.3 | 11.0 | 56.8 | 6.3 |
| **Vertical Break** | 8.8<br>+/-4.3 | -5.9<br>+/-2.9 | 17.4<br>+/-2.3 | 1.2<br>+/-0.0 | 17.6<br>+/-1.8 |
| **Horizontal Break** | 15.5<br>+/-4.1 | -7.7<br>+/-1.1 | 9.7<br>+/-2.8 | -11.3<br>+/-0.0 | 11.2<br>+/-1.8 |
| **Release Extension** | 7.0<br>+/-0.2 | 6.1<br>+/-0.3 | 6.8<br>+/-0.3 | 6.1<br>+/-0.0 | 6.4<br>+/-0.1 |
| **Release Side** | 1.3<br>+/-0.1 | 1.2<br>+/-0.1 | 0.9<br>+/-0.3 | 1.3<br>+/-0.0 | 1.0<br>+/-0.1 |
| **Release Height** | 6.0<br>+/-0.1 | 6.2<br>+/-0.1 | 6.1<br>+/-0.0 | 6.0<br>+/-0.0 | 6.1<br>+/-0.0 |
| **Pitch Tracking** | TM55 | TM55 | TM55 | TM55 | TM55 |
| **Usage %** | 18.75 | 25.0 | 40.62 | 3.12 | 12.5 |

## Insights

Your four-seamer has a high amount of Spin Efficiency (97.6%). This pitch characteristic allows you to achieve the largest amount of total movement possible with respect to your velocity and spin rate. The pitch also has a fairly typical ratio of backspin and sidespin (12:57), likely from a familiar 3/4 arm slot. Lastly, the pitch has above average RPM per Velo (26.5), which means that you have decent feel for spinning the pitch at its current velocity.

Your changeup has relatively average efficiency (92.9%) compared to your playing level. Possessing more sidespin than backspin (01:52) your changeup has decent shape to it and should play well off of your fastball. The pitch has significant separation off your fastball in terms of vertical break (8.6). We'd expect this pitch to get quite a few whiffs if leveraged properly.

Your slider has high efficiency (54.8%) for a slider. Most likely making this pitch more of a slurve or cutter depending on the spin axis. Your slider has above average gloveside break and roughly league average depth relative to a typical SL. This pitch profiles as a true slider. Low RPM per Velo (29.7). Your spin rate is below average relative to the velocity.

Your curveball has below average efficiency (33.7%) limiting the amount of movement this pitch can have. Getting spin efficiency closer to 100% will allow you to maximize break with respect to spin rate. You have a more lateral axis(07:58) on your curveball, which means that the pitch produces more horizontal break than drop and profiles like a slurve. Low RPM per Velo (31.9). Your spin rate is below average relative to the velocity.

# Performance Detail

| | Affiliate | Indy | College | HS |
|---|---|---|---|---|
| **Fastball Velocity** | 12.4 | 25.6 | 30.6 | 80.0 |
| | *4th* | *3rd* | *3rd* | *1st* |
| **Fastball Spin Rate** | 39.4 | 67.7 | 54.9 | 79.3 |
| | *3rd* | *2nd* | *2nd* | *1st* |
| **Curveball Velocity** | 35.8 | 59.8 | 50.0 | 90.0 |
| | *3rd* | *2nd* | *3rd* | *1st* |
| **Curveball Spin Rate** | 42.9 | 56.3 | 60.8 | 92.0 |
| | *3rd* | *2nd* | *2nd* | *1st* |
| **ChangeUp Velocity** | 15.6 | 24.1 | 22.8 | 78.5 |
| | *4th* | *4th* | *4th* | *1st* |
| **ChangeUp Spin Rate** | 60.4 | 62.7 | 73.3 | 83.2 |
| | *2nd* | *2nd* | *2nd* | *1st* |

← **Percentile**

← Quartile

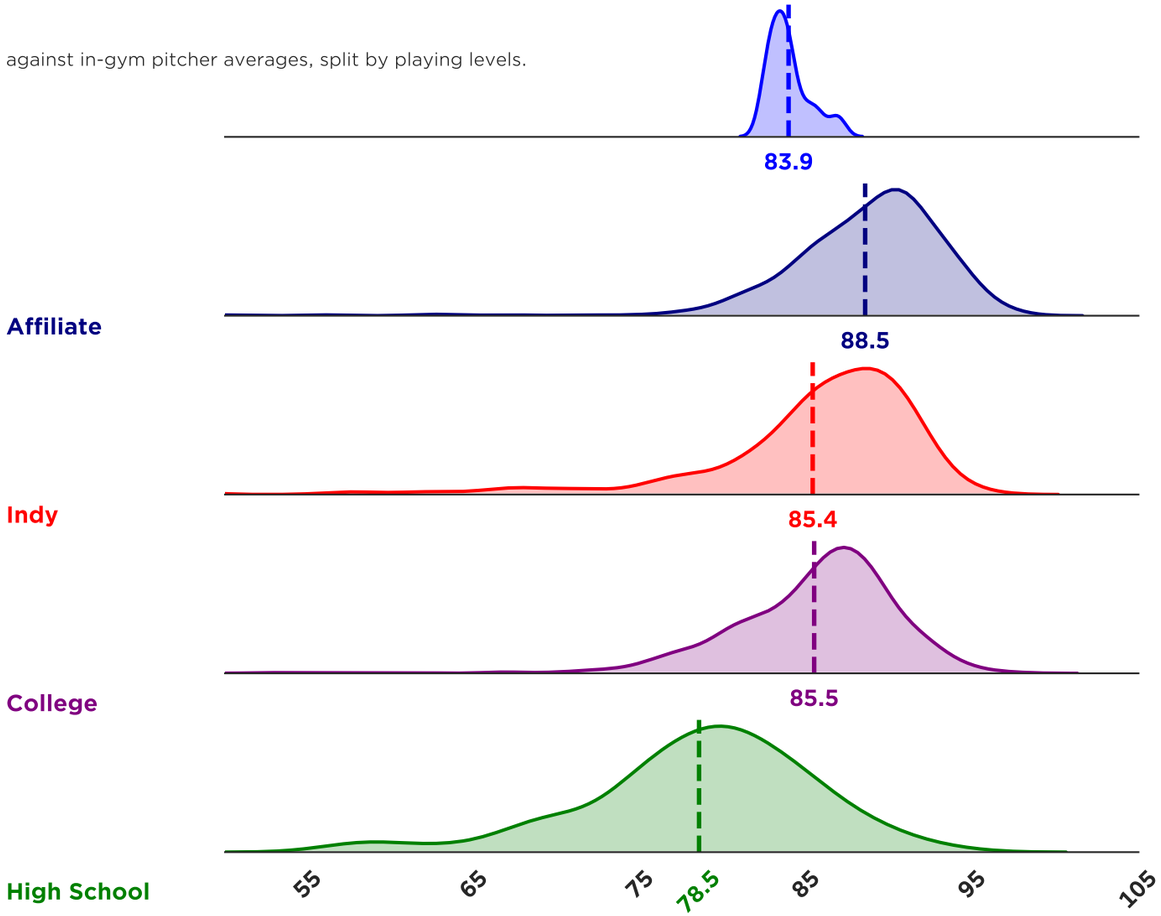
**Percentile Ranks** are rankings of each player's average velo and raw spin -- numbers in the table are shown from each of their most commonly thrown pitches in this snapshot, up to THREE pitches. The numbers shown above are percentiles in relation to the four main playing levels. For example, if a player's fastball velo ranks at 95 for average Fastball Velo at the Indy % level, that means they have an average fastball Velo higher than 95% of Indy player fastball Velo averages. The distribution plots below visualize this for the velo and spin of each of the athlete's THREE most commonly thrown pitches -- only one or two pitch types will be shown if that's the entirety of the logged data, and the 4th, 5th, etc pitches will not be shown. In other words the table above and plots below can show up to three pitches.

# Performance Detail

## Velocity: Fastball

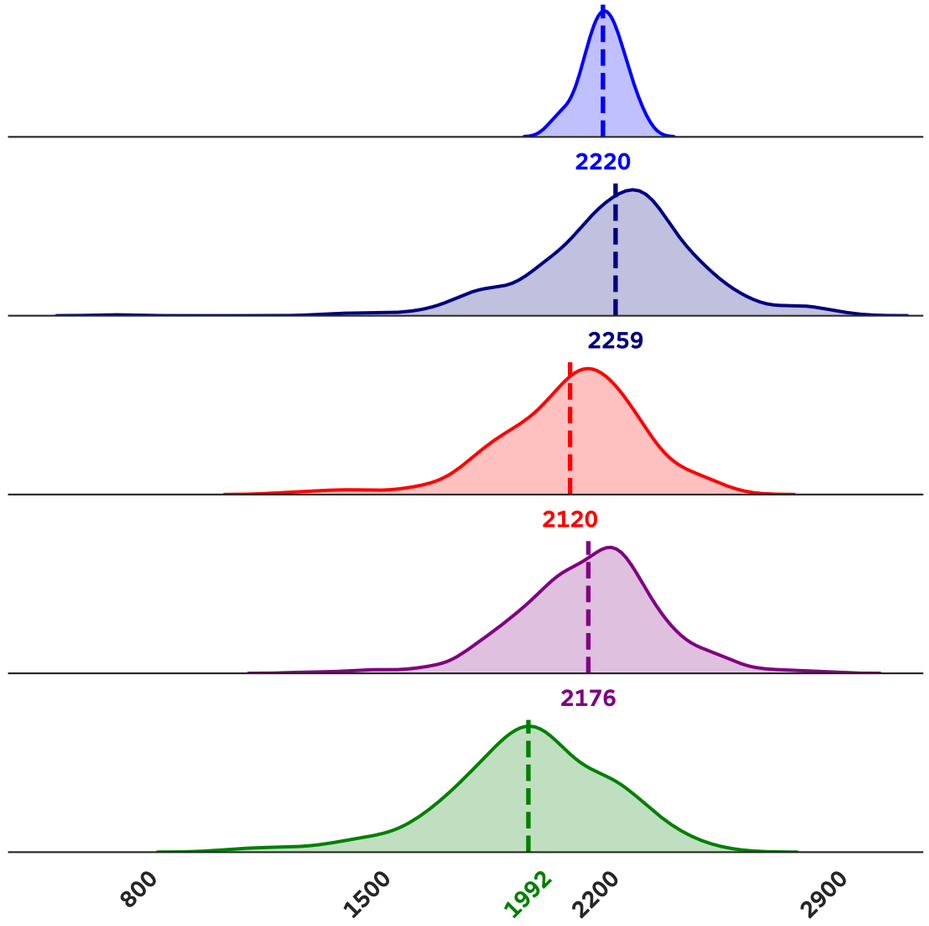
A density plot distribution of athlete s no. 1 most frequent pitch VELO

against in-gym pitcher averages, split by playing levels.




## Spin Rate: Fastball

A density plot distribution of athlete's no. 1 most frequent pitch SPIN against in-gym pitcher averages, split by playing levels.

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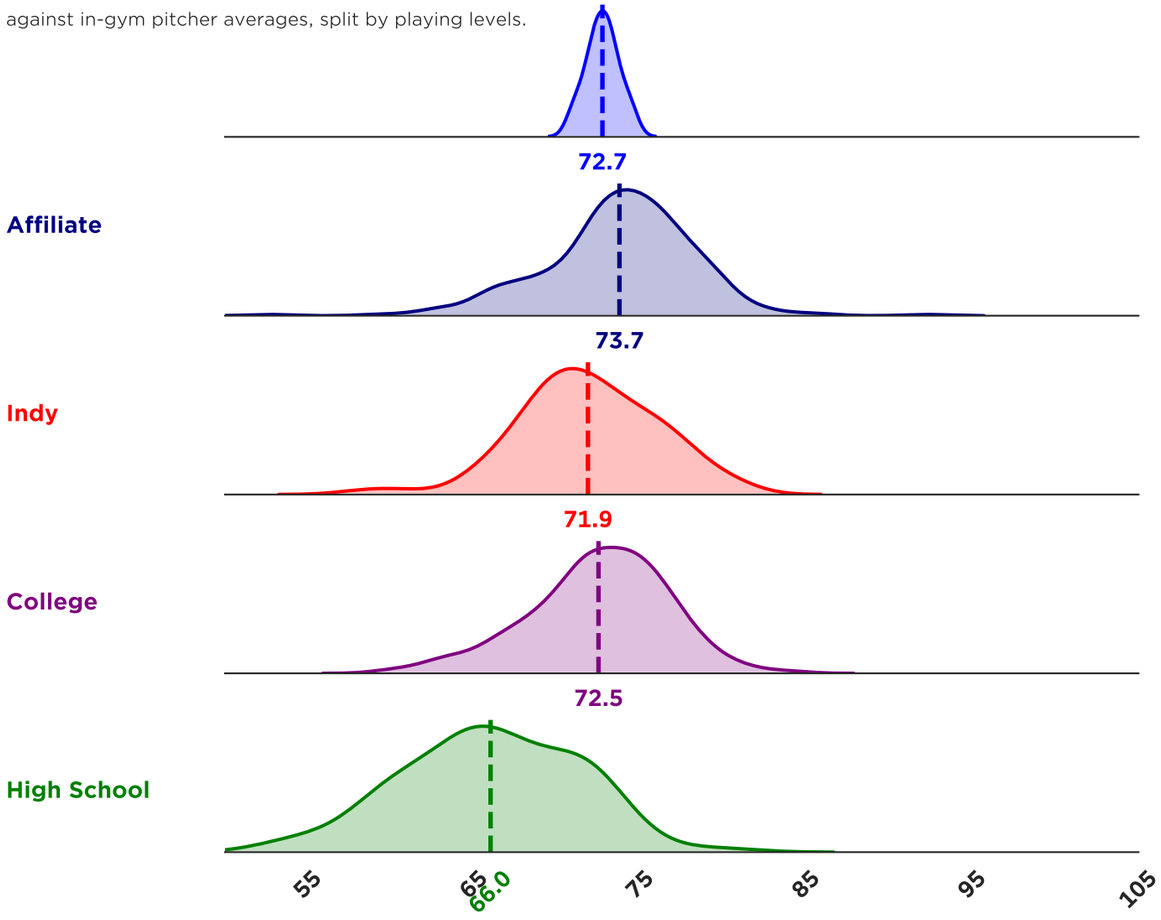
# Performance Detail

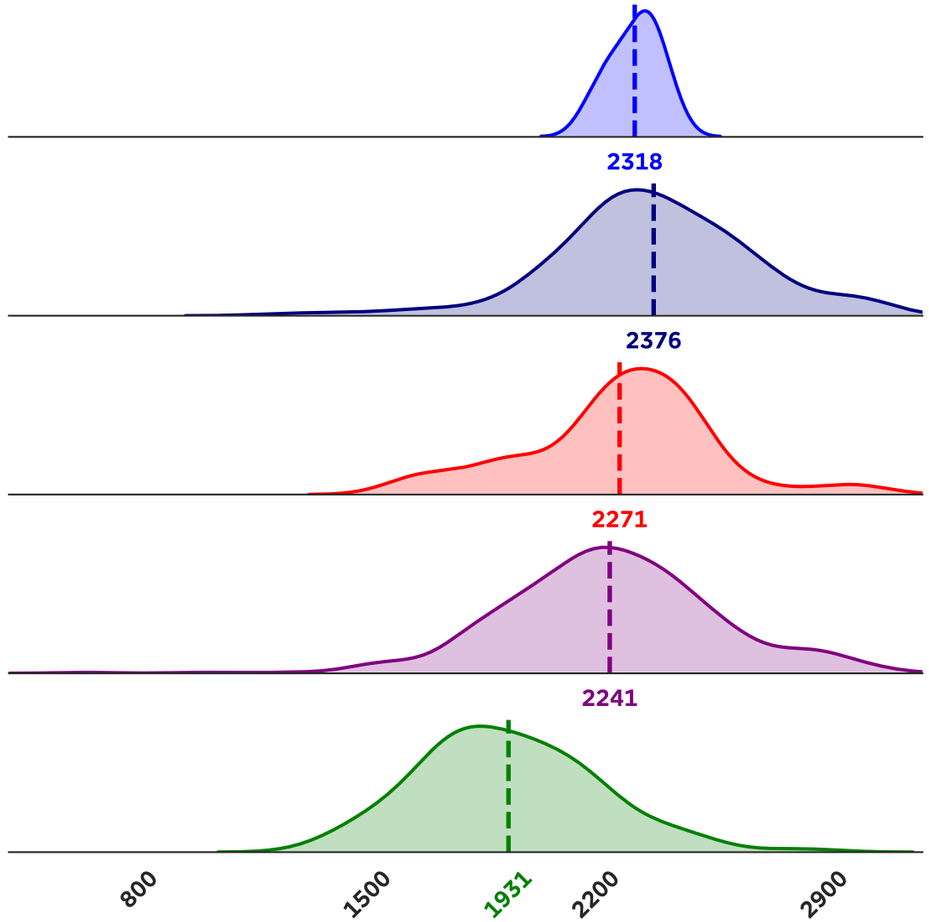
## Velocity: Curveball

A density plot distribution of athlete's no. 2 most frequent pitch VELO against in-gym pitcher averages, split by playing levels.




## Spin Rate: Curveball

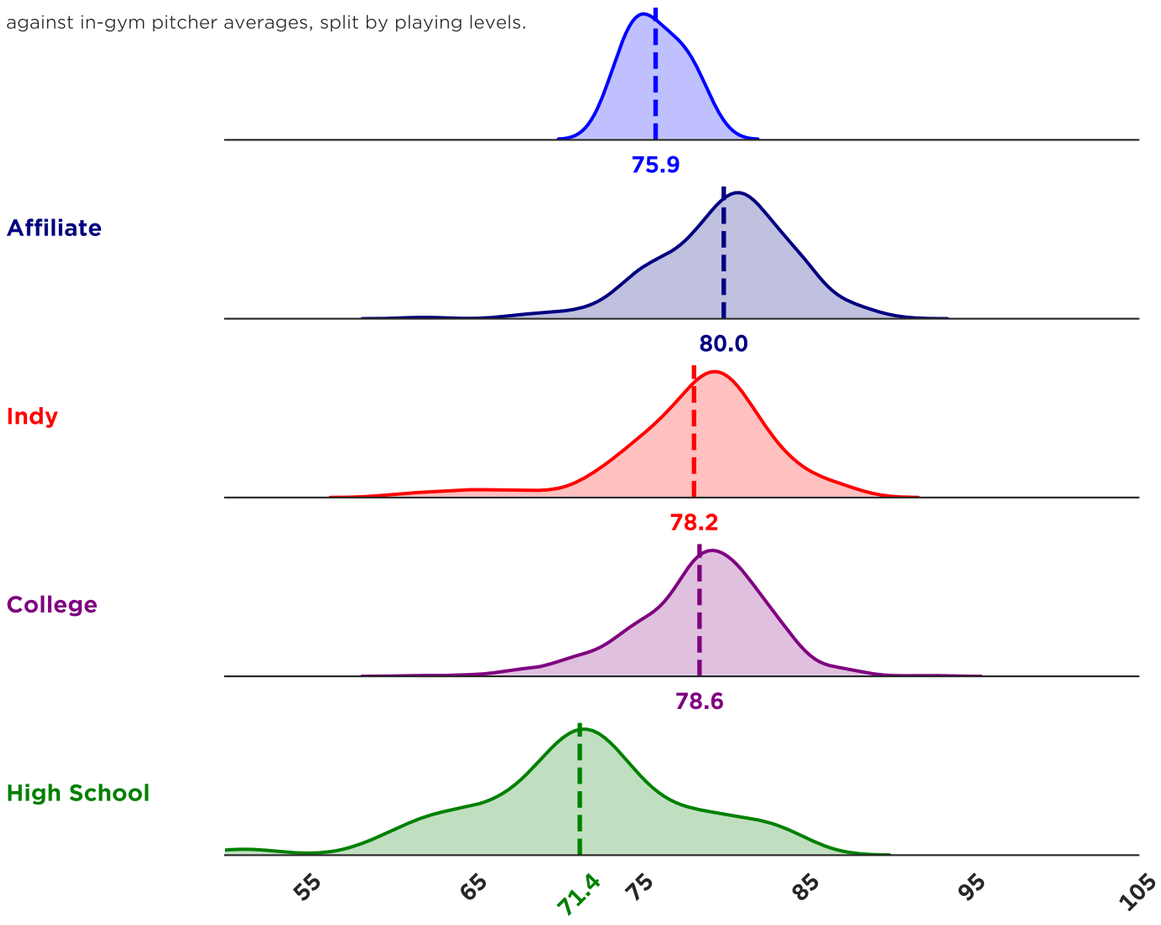
A density plot distribution of athlete's no. 2 most frequent pitch SPIN against in-gym pitcher averages, split by playing levels.



# Performance Detail

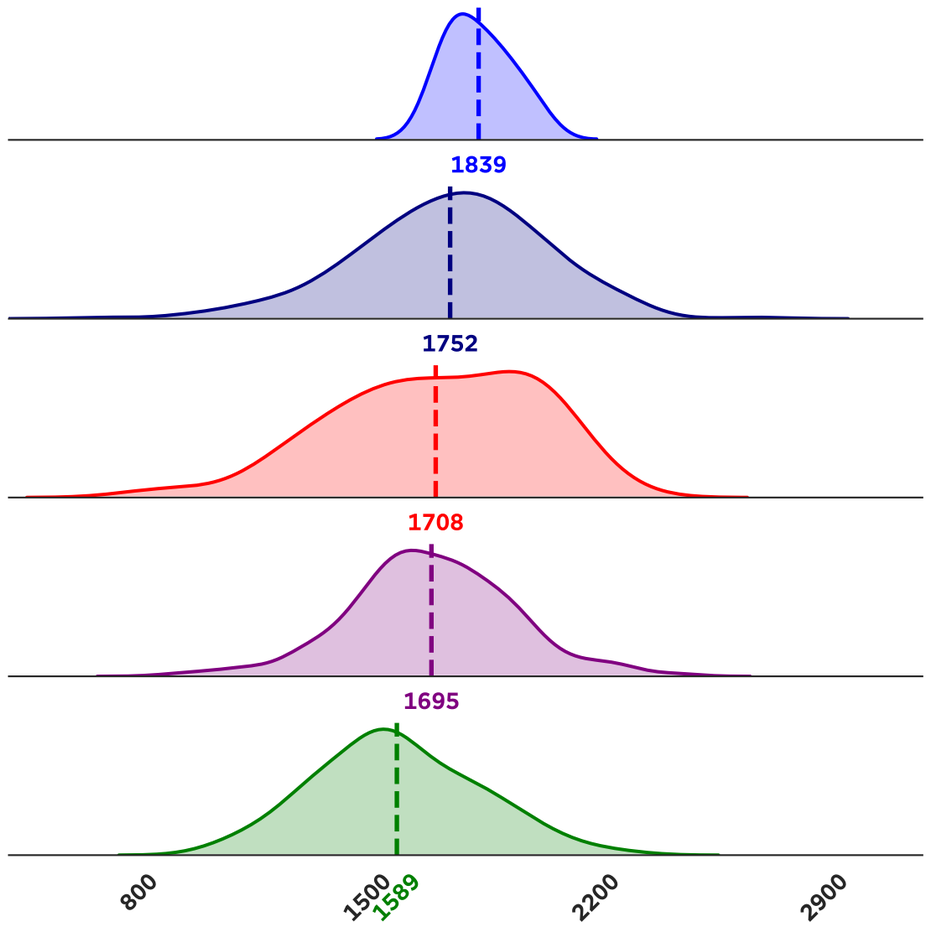
## Velocity: ChangeUp

A density plot distribution of athlete's no. 3 most frequent pitch VELO against in-gym pitcher averages, split by playing levels.




## Spin Rate: ChangeUp

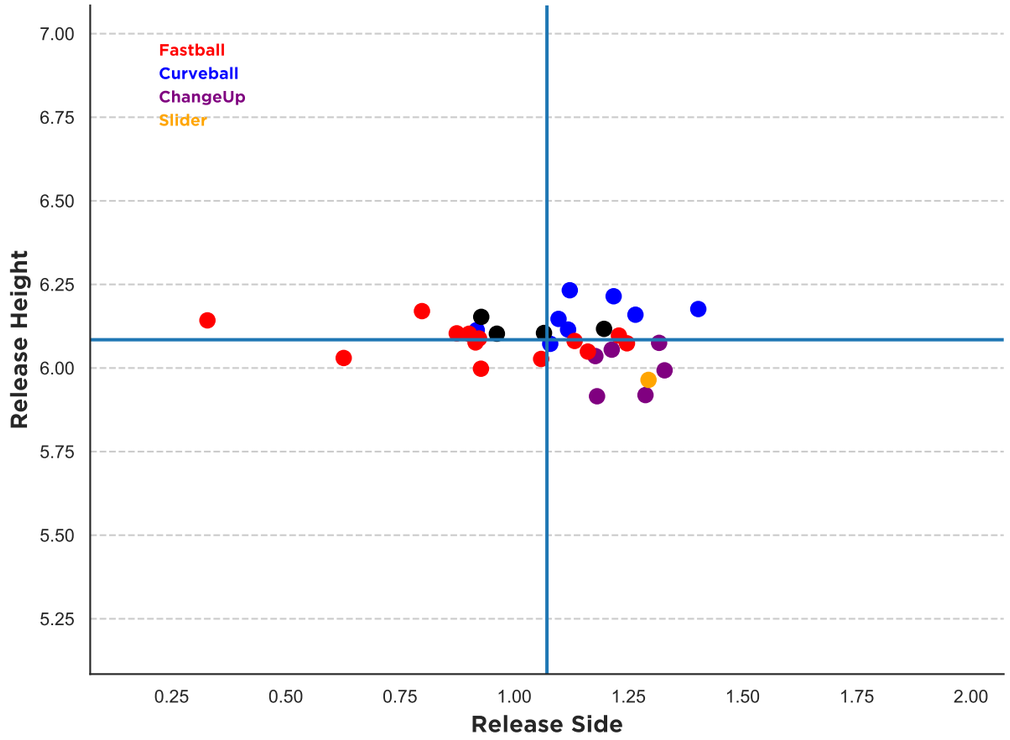
A density plot distribution of athlete's no. 3 most frequent pitch SPIN against in-gym pitcher averages, split by playing levels.



# Performance Benchmarking

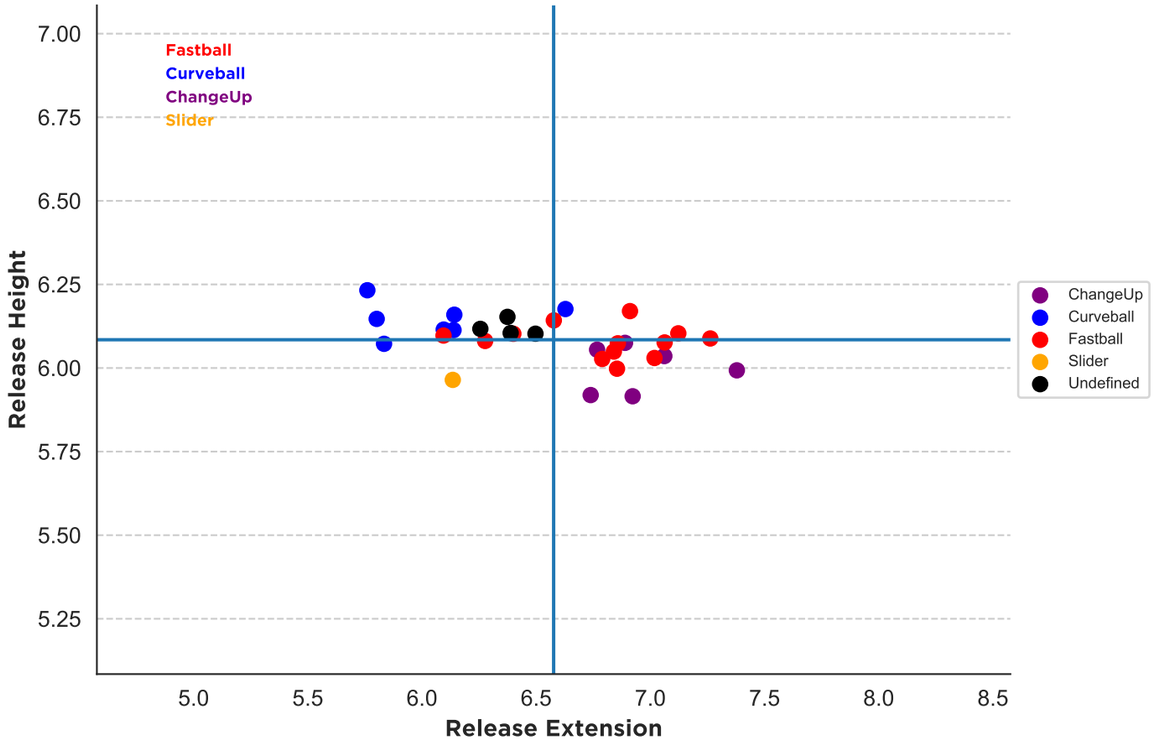
## Pitcher View Release

Color coded by pitch type
Lines are drawn through the release point centroids




## Side View Release

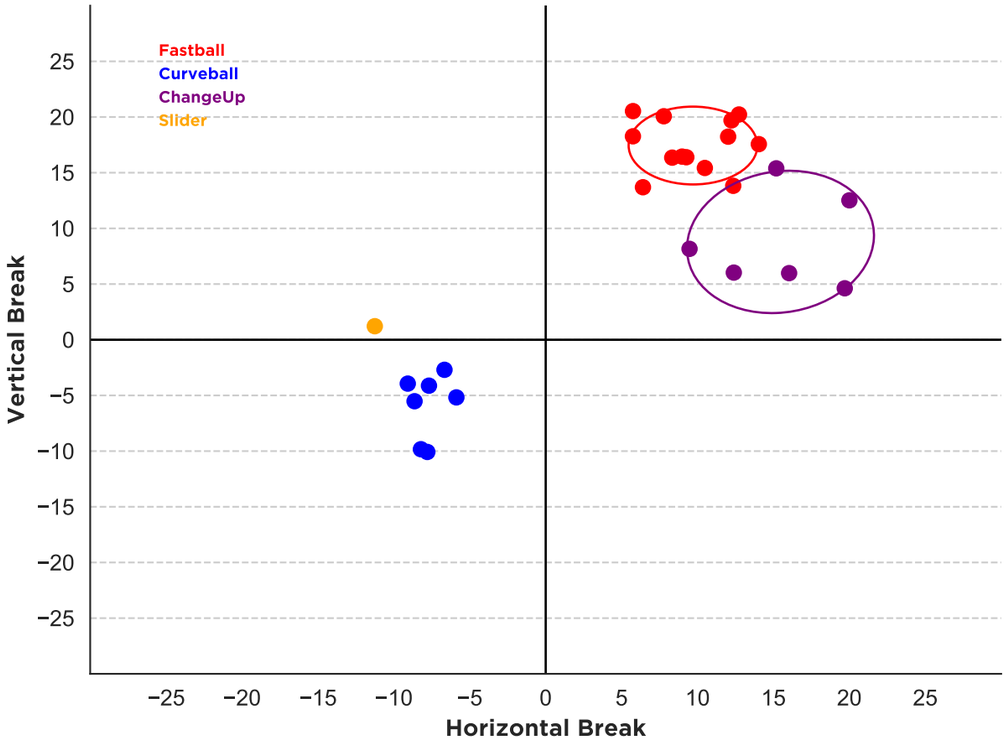
Color coded by pitch type
Lines are drawn through the release point centroids



# Performance Benchmarking

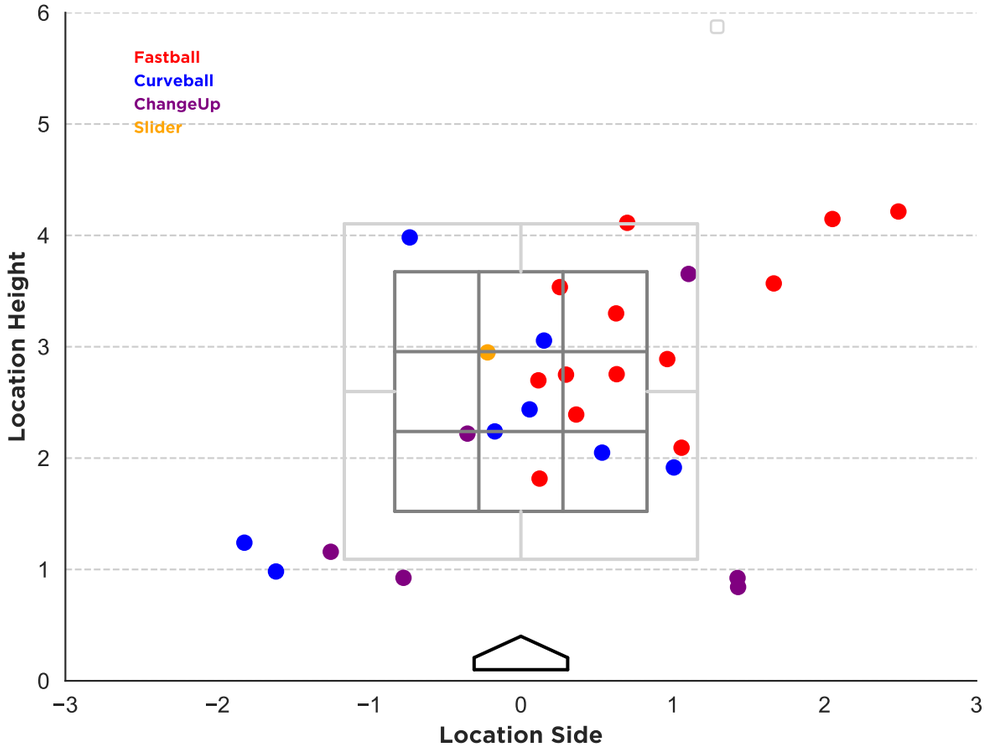
## Movement Plot

Color coded by pitch type // set for pitcher view
Confidence Ellipsoids have a 1.5 * St. Dev radius per pitch type




## Location Plot

Color coded by pitch type // set for pitcher view
Location plot imposed on strike zone graphic



# Cheat Sheet

## How To Throw a 4-Seam Fastball

In general, 4-seam fastballs have higher velocities, along with some quantity of backspin and arm side movement. In comparison to 2-seamers or sinkers, they typically have more vertical movement, less sink, and are thrown harder. Check out our blog 'How To Throw a 4-Seam Fastball' for details on different grips and cues used for successful 4-seam fb's.

**Learn More - https://rb.gy/fydks1**

## How To Throw a ChangeUp

In general, changeups are often used as off-speed pairings off a fastball, and are often thrown with a similar trajectory but an 8-12 mph velocity differential which can lead to either whiffs or soft-contact grounders. Therefore, how the change plays off the fastball is very important; in addition, changeups in general can differ quite a bit in their movement profile, with the amount of sidespin imparted on the ball dictating potential arm side fade that can create a fastball movement differential as well. Check out our blog 'How To Throw a Changeup' for details on different grips and cues used for successful changeups.

**Learn More - https://rb.gy/t9fmmw**

## How To Throw a Slider

In general, sliders will be thrown with a combination of side and gyro spin and generally move quite a bit glove side and with some amount of drop. There are a few different common slider profiles, from 'running / frisbee sliders' (or sliders with slower velocities and larger amounts of horizontal break) to 'gyro sliders' (or harder sliders with little run) to 'slutters' (or sliders with cutter-like tendencies that are thrown harder and with some positive vertical break) to 'slurves' (or sliders with more similar amounts of drop and run). Check out our blog 'How To Throw a Slider' for details on different grips and cues used for successful sliders.

**Learn More - https://rb.gy/obulne**

## How To Throw a Curveball

In general, curveballs are thrown with a large amount of topspin (as opposed to the backspin-heavy fastball) in order to induce drop and deviate from a fastball trajectory. The movement profile on a curveball will be heavily influenced by your arm slot and spin axis of the ball -- a higher release point leads to more top-down movement and what's known as a '12-6' curveball while a lower arm slot can lead to a curve with equal movement in the horizontal and vertical direction or what's referred to as a 'slurve.' Check out our blog 'How To Throw a Curveball' for details on different grips and cues used for successful curveballs.

**Learn More - https://rb.gy/7ajlw1**

## How To Throw a Cutter

In general, cutters are thrown at a high velocity and with sharp horizontal break or 'cutting action.' It often shares similar grips and releases to general fastballs, but some amount of gyro spin will help move it glove side rather than arm side. Cutters can often live between fastballs and sliders, and pitches with a large amount of run and little lift may be coined as 'slutters.' Check out our blog 'How To Throw a Cutter' for details on different grips and cues used for successful cutters.

**Learn More - https://rb.gy/h8x12t**

## How To Throw a Sinker/ 2-Seam Fastball

In general, sinkers and 2-seam fastballs can be thrown almost as hard as 4-seam fastballs, but with larger amounts of side spin and horizontal movement (sinkers will dive a bit more than 2-seamers although here we lump them together). To note - the greater amount of side spin, which you can manipulate with your arm slot and spin axis of the ball, will reduce lift and induce more sink. Check out our blog 'How To Throw a Sinker or 2-Seam Fastball' for details on different grips and cues used for successful sinkers/2-seam fastballs.

**Learn More - https://rb.gy/wjfvlt**

# Continuing Education

## Spin Rate: What we Know Now

If we picture a four seam fastball, which is thrown with backspin, the more backspin the less the ball is going to drop over its course from the pitcher's hand to the catcher's glove...A 92 MPH fastball at 2200 RPM is going to travel on an 'average' path to the plate. If this 92 MPH fastball is thrown at 1800 RPM that means less spin, less Magnus force meaning the ball will drop further over its course to the plate than the 'average' fastball described above.

**Learn More: https://rb.gy/fmoyca**

## Spin Rate Part II: Spin Axis & Useful Spin

Recall that the Magnus effect is perpendicular to the spin axis of the ball. As the figure above shows, fastballs rarely spin perfectly end over end, meaning that the Magnus effect is rarely pointing perfectly upwards. Due to the fact that the ball is on a slight tilt, the Magnus effect acts on the ball at an angle, adding a slight horizontal force. The spin axis orientation at an angle is going to cause more side spin and less backspin, causing the ball to tail and possibly cause sink.

**Learn More: https://rb.gy/jaknwj**

## A Deeper Dive into Fastball Spin Rate

There is a distinction between a high-spin fastball that has a high degree of vertical movement and one that does not. This is because of the ball's axis. So, it's not just the spin that we want to focus on. We want to focus on the spin, what the axis is, and how that is related to the movement of the pitch. Even more specific, you can have two pitches with the same velocity and spin rate but have different movement profiles based on the axis of the ball.

**Learn More: https://rb.gy/shl597**

## RPM per Velos, Pitch Movement, and Evaluating Pitches

As a quick refresher, RPM per Velos are intended to control for velocity when looking at spin rate. The equation was intended to be simple enough for coaches and players to use quickly in practice to compare pitchers to MLB average. In analyzing per-player data sets, we've seen that spin rate increases with velocity in a linear manner... RPM per Velos[are] best used to compare a pitcher's fastball to the MLB average—the average RPM per Velo, floats around 24 BUs(92 MPH and 2200 RPM)...Measuring the RPM per Velos of offspeed pitches can tell you if a pitcher spins the ball well, but even more so than with fastballs.

**Learn More: https://rb.gy/0fm6zq**

## Mastering the Axis of Rotation

For virtually every pitch type, we see that a lower slot leads to an east-west movement profile (running FBs and sweeping breaking balls), whereas a higher slot leads to a north-south movement profile (high carry FBs and 12-6 CBs) ...Of course, when manipulating a pitcher's axis of rotation on a given pitch type, Spin Direction / Tilt is only one of two metrics that needs to be considered. As mentioned earlier, Spin Axis is a three-dimensional concept, which moves along an x-y axis (or gyro component) as well. Typically, the x-y component of a pitch's axis of rotation is represented in units of Spin Efficiency...[the percentage of spin directly impacting the movement of a pitch (Rapsodo)]

**Learn More: https://rb.gy/jaknwj**

## A Deeper Dive Into Offspeed Pitches: Pitch Classification

...raw spin rate can help you bucket a curveball or slider and can say whether they have a high, average, or low spin rate. But it doesn't tell you too much more about the pitch. Instead, the movement of a pitch is better described by two different categories of total spin: transverse spin and gyrospin. Transverse spin, which travels perpendicular to the direction of velo of the ball, is the main driver of magnus force.

**Learn More: https://rb.gy/btd76b**