Catching Module

The HitTrax Catching Module provides valuable insight to a catcher's performance by measuring the metrics associated with throwing out a runner at 2nd base. HitTrax provides immediate feedback on the catcher's timing and throw, so catchers can make adjustments, optimize their movements and learn the feel of an ideal throw.

The following metrics are reported in this module:

- Pop Time
- Exchange (Transfer Time)
- Arm Strength
- Throw Accuracy
- Projected Outcome
- Time Differential of Outcome
- High Speed Video (available with HitTrax VCAM)

Using the Catching Module

The catcher should be positioned 4.5 feet behind home plate in a full catcher's squat when receiving the pitch.

A pitch is not required to measure arm strength and throw accuracy, but IS required to measure pop time, exchange, and to report a play outcome. The pitch does not have to be at full speed, but must be above 17 mph.

NOTE: If the catcher's throw release point is too far in front of home plate, errant readings could occur

METRIC DEFINITIONS

Pop Time is typically defined as the instant a pitch hits a catcher's glove to the moment it strikes the glove of the middle infielder at second base. HitTrax adapts this definition as there may not be a "pop" of a middle infielder's glove to stop the clock. Therefore, HitTrax measures the time from the impact of the catcher's glove, to the calculated arrive time for the ball to reach the center of 2nd base (calculated by the measured throw velocity).

Example of pop times across skill levels:

Baseball

- 1.8 seconds – Elite level
- 2.0 seconds – MLB average
- 2.1 seconds – Average for college
- 2.2 seconds – Average for high school seniors
- 2.4 seconds – Average for high school freshman

Fastpitch

- 1.6 seconds – Olympic level
- 1.8 seconds – Elite college level
- 1.9 to 2.1 seconds – Average for college
- 2.3 seconds – Average for high school

Baseball Skill Level	Throw Distance to Second
8U	
10U	84' 10"
12U	
13U	113' 1"
15U	
High School	
College	127' 3"
Professional	
Softball Skill Level	
Age 9 to 12	
High School	
College	84' 10"
Men's Softball	

Exchange (a.k.a. transition time) is the time between the instant the pitch hits the catcher's glove to the moment the catcher releases the ball.

Results of 2017 MLB exchange times for catchers (as reported by Statcast™/Baseball Savant)

- 0.64 seconds – Elite
- 0.73 seconds – MLB average
- 0.85 seconds - Poor

Arm Strength is the measured velocity (mph) of the catcher's throw to the base. HitTrax measures peak velocity of the throw the measurement occurs immediately after the ball is released by the catcher.

Results of 2017 MLB Arm Strength for catchers (as reported by Statcast™/Baseball Savant)

- 87.8 mph – Elite
- 81.8 mph – MLB average
- 74.7 mph – Poor

Throw Angle

Vertical – Similar to a hitter's launch angle, the vertical throw angle is the angle of the trajectory of the throw, in degrees, to the horizon at the point of release. The higher the throw angle, the higher the throw is off the ground. The catcher will need to find their optimal throw angle based on his/her arm strength.

Horizontal – the horizontal angle will provide you with the left/right accuracy of the throw with respect to the bag. A throw directly on the center of the bag will produce a 0° horizontal angle. Positive angles will be to the right of 2nd base while negative angles will be to the shortstop side of the bag. The optimal horizontal angle is ~1°, producing a throw that is 1-2 feet to the right of 2nd base.

Result – Using a number of variables, HitTrax calculates whether the runner would have been caught stealing or would have been called safe. Along with the measured pop time and throw accuracy, the following variables are used in this calculation:

- Time for pitcher to deliver from stretch
- Velocity of fastball
- Lead of runner off of 1st base
- Jump (reaction time) of runner
- Baserunner's time to second
- Time for infielder to tag runner from position where throw was fielded

The values used for the baserunner's time to second, as well as the velocity of the pitch, will vary depending on the skill level of the catcher.

Baseball Skill Level	Base Runner Time to Second	Length of Lead off of 1st Base	Assumed Fastball Pitch Velocity
8U	3.45 s	No lead	45 mph
10U	3.40 s	No lead	50 mph
12U	3.30 s	No lead	60 mph
13U	3.40 s	2.5 m	68 mph
15U	3.70 s	3.5 m	76 mph
High School	3.60 s	4.0 m	80 mph
College	3.54 s	4.0 m	86 mph
Professional	3.38 s	4.0 m	92 mph
Softball Skill Level			
Age 9 to 12	3.60 s	No lead	41 mph
High School	3.00 s	No lead	54 mph
College	2.90 s	No lead	64 mph

For the timing of the jump, the runner's start time begins 0.5 seconds before the pitcher's projected release point. Note that the average release time for a pitcher is 0.9 seconds from start of motion. Therefore, the runner begins roughly half-way through the pitcher's motion.

Time differential (+/-) is measured measured in +/- seconds and represents the amount of time that the throw beat the runner to second base, or how long the infielder was late applying the tag.

A negative time (-) results in an 'out' while a positive time (+) indicates that the throw was late and the runner was safe. For example:

+/-	Outcome
- 0.24 seconds	Runner is 'Out' by 0.24 seconds
+ 0.35 seconds	Runner is 'Safe' by 0.35 seconds