

# Mocap Report: Luke Coats

Date: August 29, 2025

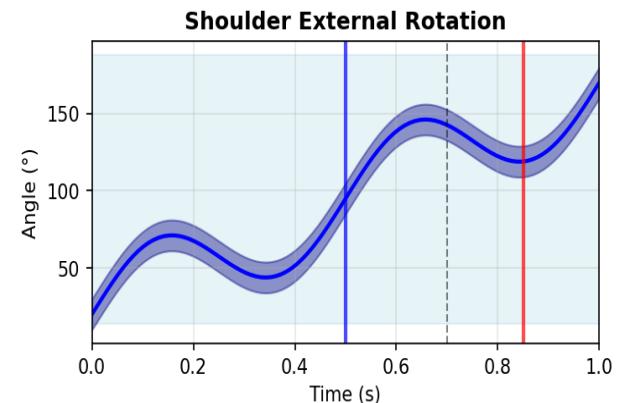
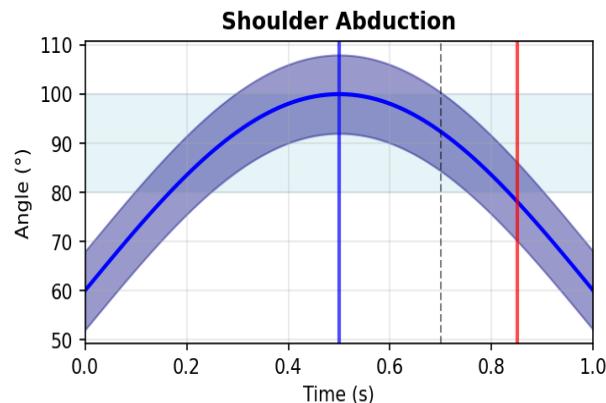
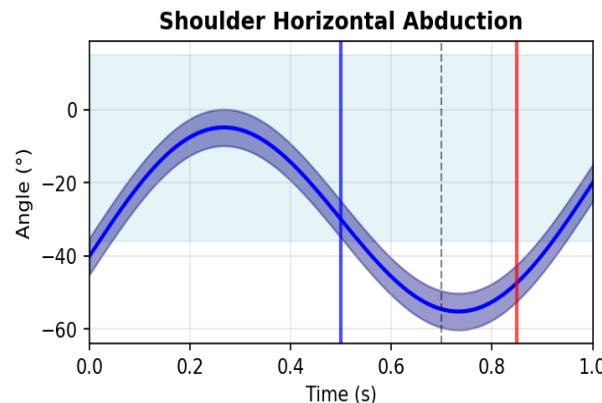
Velocity: 90mph - 92mph

## SUMMARY

Key Metrics	Foot Plant	Max External Rotation	Release	Angular Velocities	
Shoulder Horizontal Abduction	-44° ± 1°	-4° ± 2°	1° ± 1°	Knee	-338°/s
Shoulder Abduction	91° ± 2°	102° ± 0.6°	99° ± 1°	Pelvis	594°/s
Shoulder External Rotation	48° ± 4°	193° ± 1°	123° ± 3°	Trunk	1060°/s
Elbow Flexion	113° ± 1°	86° ± 1°	30° ± 1°	Elbow	2209°/s
Trunk Forward Tilt	13° ± 1°	33° ± 1°	48° ± 1°	Shoulder	4277°/s
Trunk Rotation	109° ± 2°	-6° ± 0.8°	-20° ± 0.7°		
Hip-Shoulder Separation	51° ± 2°	11° ± 2°	6° ± 3°		
Pelvic Forward Tilt	7° ± 0.6°	45° ± 1°	55° ± 2°		
Pelvic Rotation	57° ± 3°	-9° ± 2°	-11° ± 2°		
Knee Flexion	61° ± 2°	58° ± 4°	48° ± 3°		

Stress	
Shoulder Force	129%BW
Shoulder Torque	7%BWH
Elbow Torque	6%BWH

# Shoulder



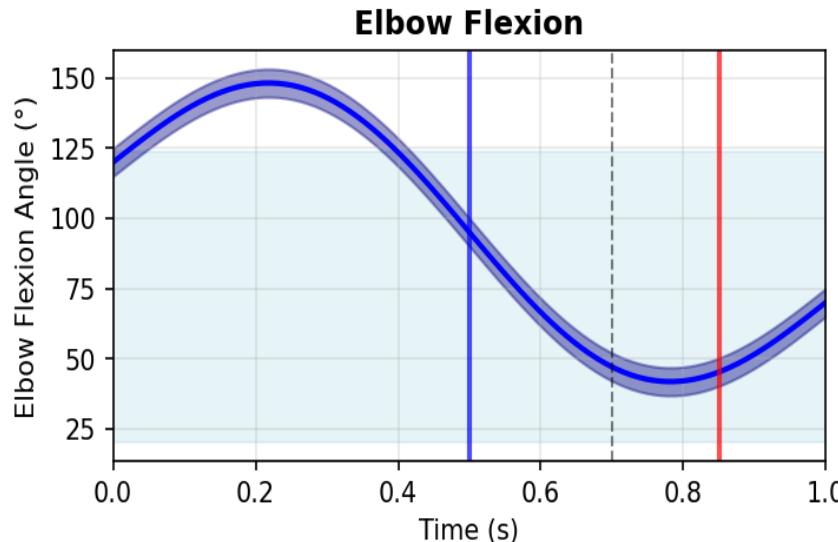
	Mean ± Std Dev	Reference
FP	-44° ± 1°	-12° - -36°
MER	-4° ± 2°	-7° - 15°
REL	1° ± 1°	-1° - 23°

	Mean ± Std Dev	Reference
FP	91° ± 2°	80° - 100°
MER	102° ± 0.6°	82° - 98°
REL	99° ± 1°	82° - 98°

	Mean ± Std Dev	Reference
FP	48° ± 4°	14° - 90°
MER	193° ± 1°	170° - 188°
REL	123° ± 3°	97° - 121°

**Timing:** On Time

# Elbow / Arm Slot



	Mean ± Std Dev	Reference
FP	113° ± 1°	94° - 124°
MER	86° ± 1°	74° - 94°
REL	30° ± 1°	20° - 30°

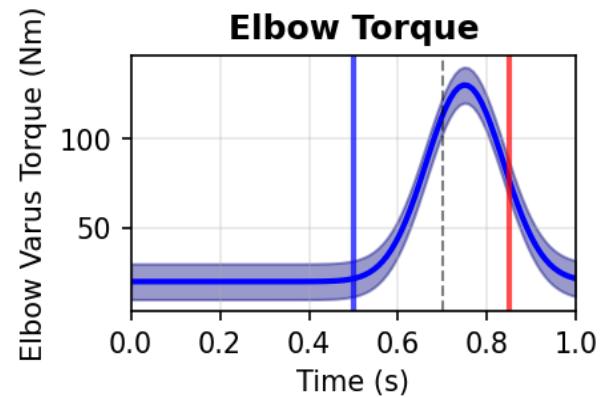
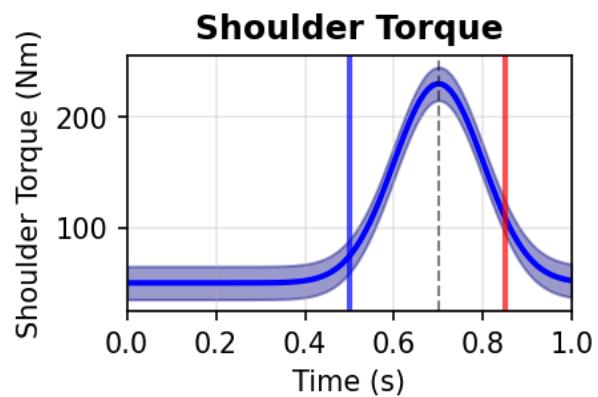
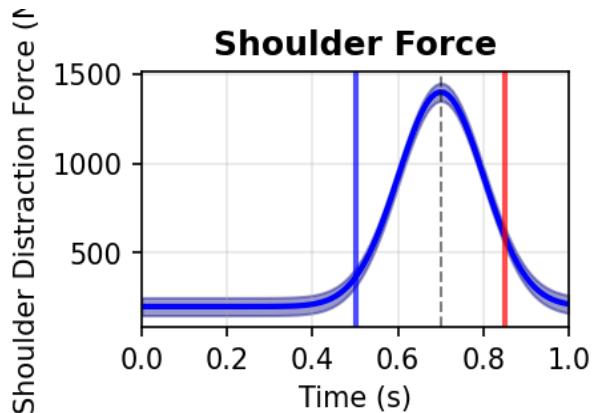


### Arm Slot

Arm Slot (°):  $62^\circ \pm 2^\circ$

Arm Slot: [Low Three-Quarter](#)

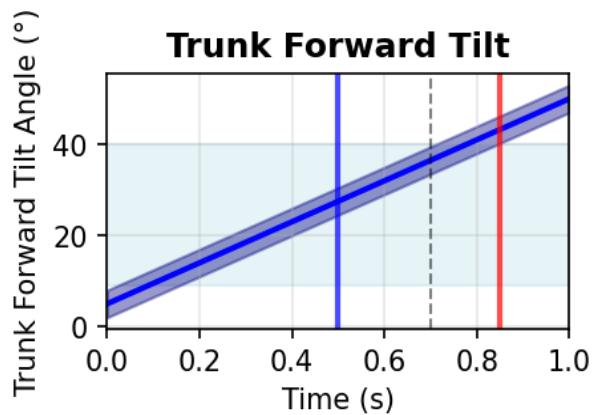
# Throwing Arm Stress



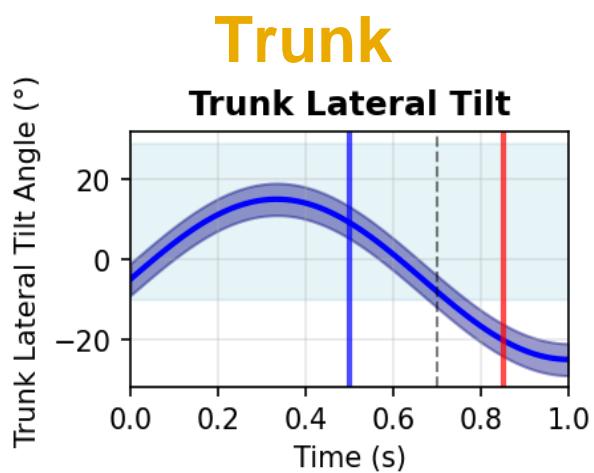
Mean ± Std Dev		Reference
Max (N)	1238N ± 66N	1361N - 1929N
Max (%BW)	129% ± 7%	176% - 224%

Mean ± Std Dev		Reference
Horiz Abd Max (Nm)	235Nm ± 83Nm	
Horiz Abd Max (%BWH)	9% ± 1%	
Int Rot Max (Nm)	236Nm ± 15Nm	151Nm - 277Nm
Int Rot Max (%BWH)	5% ± 1%	17% - 29%

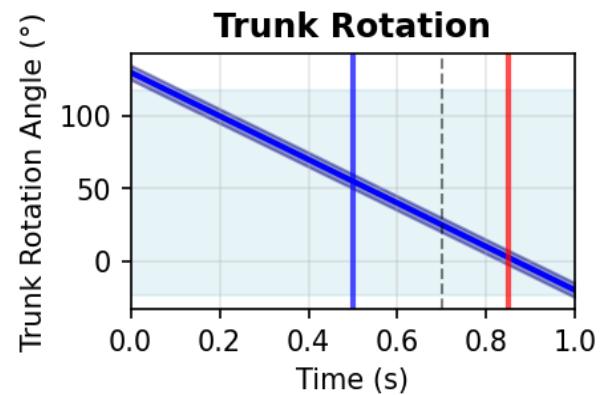
Mean ± Std Dev		Reference
Max (Nm)	130Nm ± 11Nm	115Nm - 171Nm
Max (%BWH)	6% ± 0%	13% - 17%



	Mean ± Std Dev	Reference
FP	$13^\circ \pm 1^\circ$	$9^\circ - 21^\circ$
MER	$33^\circ \pm 1^\circ$	$10^\circ - 22^\circ$
REL	$48^\circ \pm 1^\circ$	$26^\circ - 40^\circ$

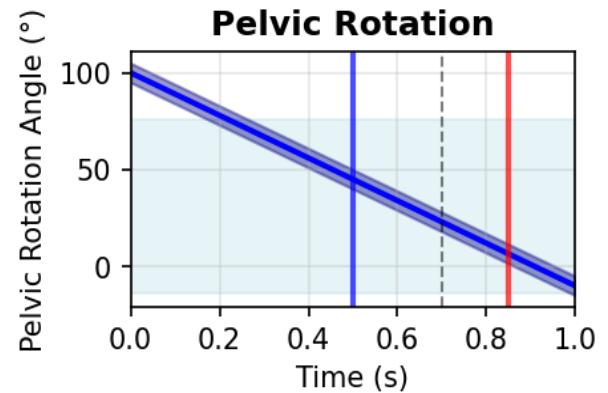
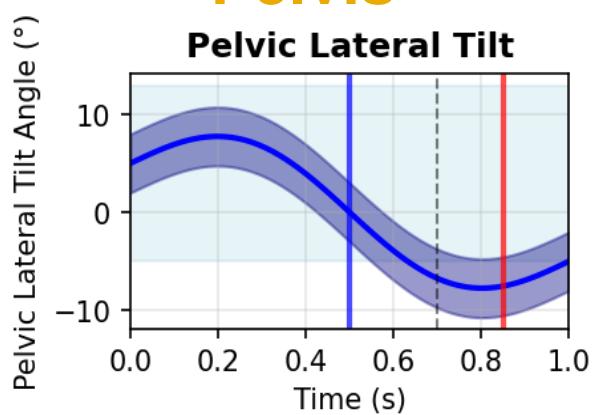
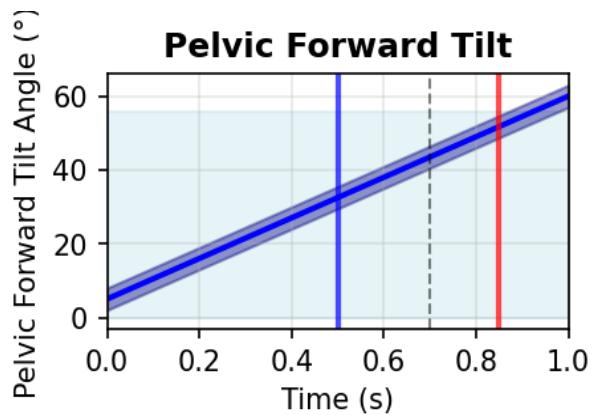


	Mean ± Std Dev	Reference
FP	$4^\circ \pm 0.8^\circ$	$-10^\circ - 0^\circ$
MER	$15^\circ \pm 0.5^\circ$	$13^\circ - 29^\circ$
REL	$8^\circ \pm 0.5^\circ$	$8^\circ - 28^\circ$



	Mean ± Std Dev	Reference
FP	$109^\circ \pm 2^\circ$	$95^\circ - 118^\circ$
MER	$-6^\circ \pm 0.8^\circ$	$-5^\circ - 15^\circ$
REL	$-20^\circ \pm 0.7^\circ$	$-4^\circ - -24^\circ$

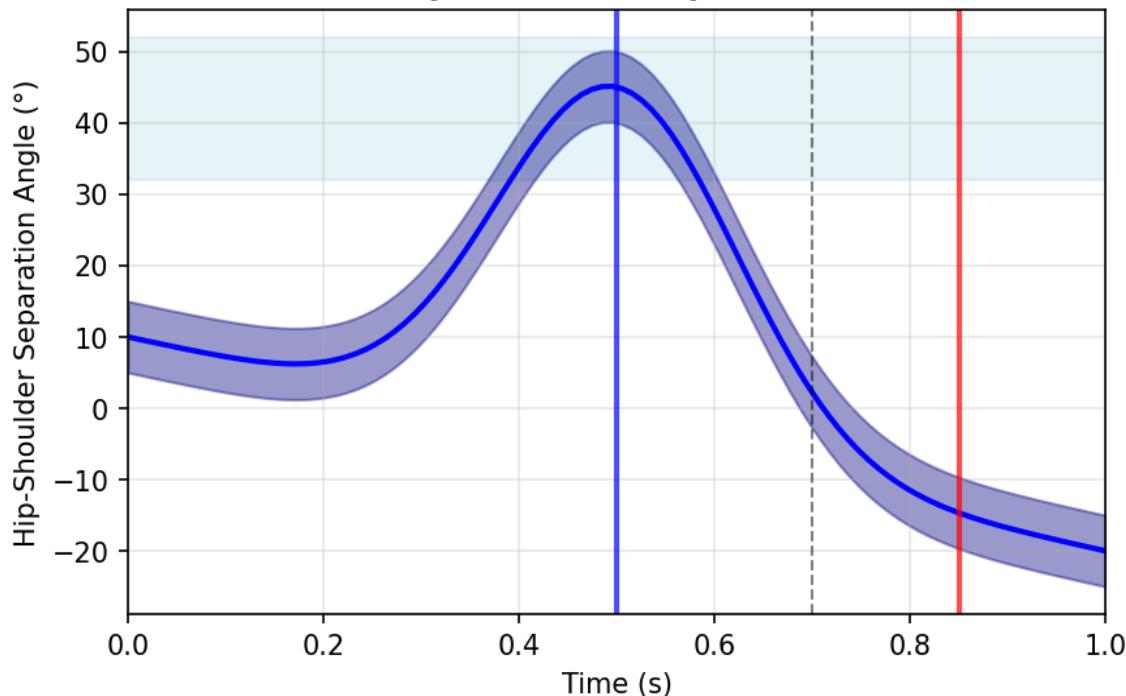
**Timing:** On Time



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# Hip-Shoulder Separation

## Hip-Shoulder Separation

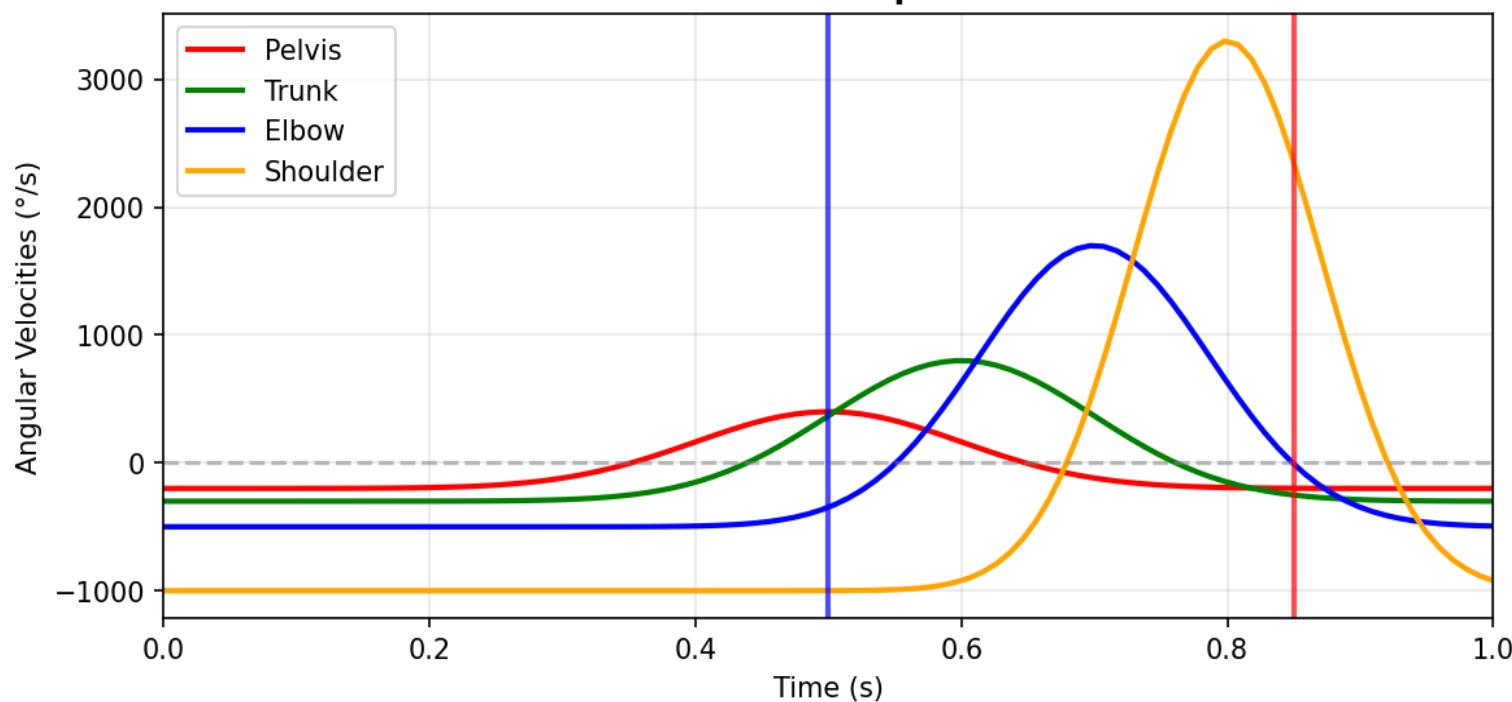


**Hip-Shoulder Separation** is the difference in angle created between your pelvis rotation and trunk rotation. When the pelvis leads the trunk this angle is positive, and when you close the gap using all the stretch you created then the angle becomes negative around release as the trunk passes the pelvis. Hip-Shoulder Separation is created through proper trunk and pelvis rotation timing.

	Mean ± Std Dev	Reference
FP	51° ± 2°	32° - 52°
MER	11° ± 2°	
REL	6° ± 3°	

# Kinematic Sequence

## Kinematic Sequence



	Order	Mean $\pm$ Std Dev	Reference
Pelvis	1	$594^{\circ}/\text{s} \pm 20^{\circ}/\text{s}$	$581^{\circ}/\text{s} - 811^{\circ}/\text{s}$
Trunk	2	$1060^{\circ}/\text{s} \pm 33^{\circ}/\text{s}$	$861^{\circ}/\text{s} - 1187^{\circ}/\text{s}$
Elbow	3	$2209^{\circ}/\text{s} \pm 58^{\circ}/\text{s}$	$2030^{\circ}/\text{s} - 2542^{\circ}/\text{s}$
Shoulder	4	$4277^{\circ}/\text{s} \pm 162^{\circ}/\text{s}$	$3801^{\circ}/\text{s} - 4923^{\circ}/\text{s}$

# Report Information

## Important Events

**MKH = Maximum Knee Height** and is the moment where your lead knee is at the highest point in the beginning of the delivery. It is represented by the first small black tick mark on the graph.

**FP = Foot Plant** and is the moment where your whole lead foot contacts the ground. It is represented by the vertical blue line on the graph.

**MER = Maximum External Rotation** and is the moment where your pitching shoulder reaches its maximum external rotation angle. It is represented by the second small black tick mark on the graph.

**REL = Release** and is the moment where you release the ball, determined by your maximum wrist velocity. It is represented by the vertical red line on the graph.

## Graphs

- All data is only on fastball mechanics
- Graphs start 0.1 seconds before MKH and end 0.1 seconds after release
- **Thin blue line** is the mean of all your fastball data for each metric over the duration of a pitch
- **Darker blue-gray shaded area** surrounding the mean line is the standard deviation range of all your fastball data for each metric over the duration of the pitch. The smaller the region the more consistent your mechanics
- **Lighter blue shaded region** is the reference data
- Reference data is MLB averages from Kinatrax

## Other Abbreviations

**BW = Body Weight** and is your weight in Newtons.

**BWH = Body Weight Height** and is your weight in Newtons multiplied by your height in meters.

**Std Dev = Standard Deviation** and is the standard deviation of your data from multiple pitches away from your mean data.

## Tables

Within the reference range	Between the reference range and one Std Dev outside of it	
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Being in or out of range is just a guide, it is not necessarily good or bad.

## Skeletons

Skeleton images are from the mechanics of your highest velocity fastball, or from your first fastball if the data wasn't paired with Trackman.