



Masaryk University

Faculty of Sports Studies

2D and 3D Motion Analysis

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Analysis of the starting blocks in Swimming

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Analysis of the starting blocks in Swimming

For the evaluation of the starting blocks, I used filming of a federated athlete in swimming, with extensive experience in Grab Start.

A calibration system (1x1m) was used, as is shown in Figure 1. And I used the software motion analysis: Utilius EasyInspect.

Calibration system



Figure 1 - Calibration system adopted (1x1m).

Coordinates of the calibration system:

Points	X (m)	Y (m)
1	0.0	0.0
2	0.0	1.0
3	1.0	0.0

Motion Analysis

For the evaluation of this technique, I analyzed several characteristics that could help me, that is, three different angles: Knee, Basin and Shoulder; the distance reached by the athlete (performance); the speed and angular acceleration of the body segments from the passage of the Preparation Phase for Departure Phase.

In Figure 2 we can visualize the layout of the body segments in the Preparation Phase and Departure Phase in technique Grab Start.

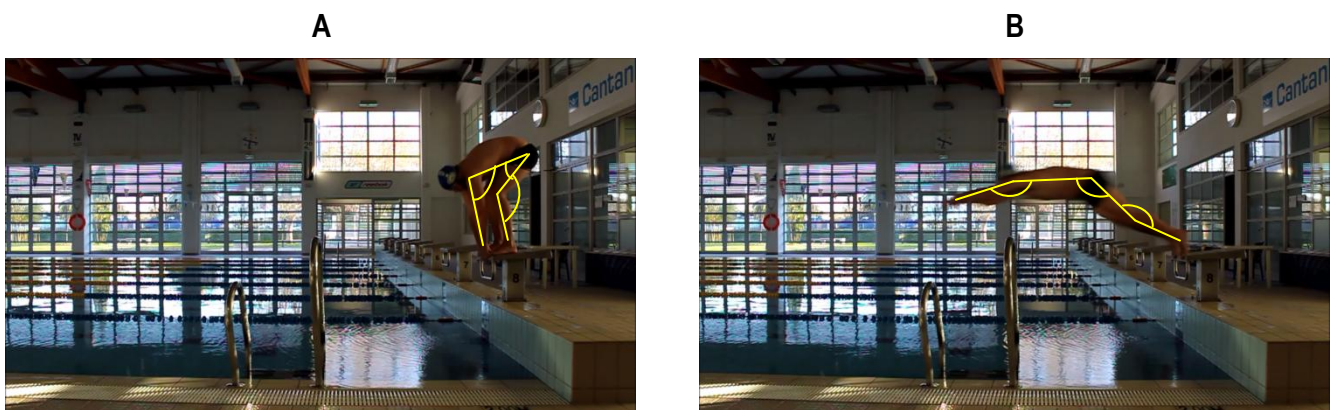


Figure 2 - Passage of the Preparation Phase (A) for Phase Departure (B).

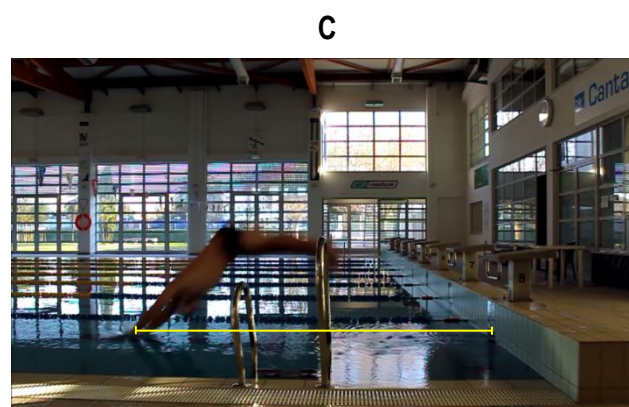


Figure 3 - Distance reached by the athlete.

	A)	B)
Knees	122.3°	147.9°
Basin	24°	141.7°
Shoulders	107.1°	162.4°

In the Preparation Phase the athlete has the lower and upper limbs bent, while in the Departure Phase is realized an extension of them. The knee angle suffers an increased, rising from 122.3° to 147.9°.

The basin level I checked a large angular difference, in the first phase angle was 24° and passes to 141° at the time of departure.

In the arms there is also a wide angular variation, since the athlete in the Preparation Phase passes of an angle of 107.1° to 162.4° in the next step. These changes were made only in 00:00.64 seconds.

With this technique, the athlete reached a maximum distance of 1.87metros - Performance, and since the Preparation Phase until the moment that the hand enters in the surface of the water, it takes 0.64" (seconds).

Angular data of the Grab Start:

	A	B	$\Delta\theta$	ω	α
Knee	122.3°	147.9°	25.6°	36.57°/s	52.24°/s ²
Basin	24°	141°	117°	167.14°/s	238.77°/s ²
Shoulders	107.1°	162.4°	55.3°	79°/s	112.86°/s ²