

# **Using underwater video analyses to develop technical skills**

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# Video recording setup

- 4 video cameras ( 2- underwater, 2- above)
- Special trolley for moving 3 cameras along poolside
- Start signal flash equipment ( under and above water)
- 2 persons running all testing procedure – one operating start signal and start camera, another operating trolley cameras and running along poolside - following the swimmer

# Filming procedure

- Testing exercise:

## **FOR Style swimmer (about 6-8 min per swimmer)**

25m from start signal - full speed! (start test)

25m in + 25m out – full speed (turn test)

25m in + 25m out – full speed (swimming test)

## **FOR Medley swimmer (about 15 min per swimmer)**

25m Butterfly start – full speed (start test)

3 turns changing styles 15m in+15m out (turns test)

4 x 50m (25+25) different styles (swimming test)

# Analyses software

- Mac computers ( OS X operating system)
- Special Video analyses software:
- Standard Apple software - IMovie , Quick Time

# Analyses procedure

- The next day **personal “feedback sessions”** together with swimmer and coach in small conference room using big video screen
- (45 min per swimmer = 15min + 15 min +15min)  
Start, Turn, Swimming style
- Demonstration of original testing Movie - all views
- Detailed analyses and evaluation of each technique elements
- Screen Recording all discussions and measuring
- Immediate delivering memory stick with both video files – Original Movie and Analyses Movie – to swimmer

# Technique analyses

- Swimming motion is the process of changing positions all time. Body rotating, head, arms and legs moving up- down-forward-backward the same time under and above water.
- Video Analyses of starts, turns, swimming styles makes possible to improve Technique of all elements

# Analyses of Timing

- Timing of arms and legs, body movements, breathing is most important thing of swimming technique and start and turns

Timing of technique elements can be identified by still frames and slow motion video – beginning-ending actions of phases and positions between

# Analyses of Kicking

## Underwater Kicking

- Using Underwater dolphin kicking is very effective (back- free- fly) - one of the key element during start and turns
- Rhythm and parameters of kicking can be identified and precisely measured by Video !



## ...Kicking Rate / Distance per kick

- KR Indicate amount of underwater butterfly kicks per minute (repeating one full up/down cycle)
- Slow & Fast kick rate 100 – 200 kicks/min
- Optimum legs kick rate - depending start or turn, tactics –about 150-180 kicks per minute
- Amount of kicks – up to 10 kicks – up to 15m after start and turn
- Videoanalyses can measure also Distance per kick !
- KL indicate length of forward propulsion during up/down kick (about 0.6m - 1.0m)

# Free/Back/Fly kicking

- Analyses of Slow motion and Still frames makes possible to understand and evaluate :
  - rhythm , asymmetry and count amount of kicks per cycle
  - timing of each kick related to arm strokes
  - action of each single kick (6 or 4 or 2 beat style)
  - timing of leg kicks related each other
  - Depth, amplitude, rotation (hip) flexibility (ankle) and transfer of power to body from hip and knee

# Breaststroke kicking

- Video identify the effect and timing of single fly kick after glide at start and turns
- Timing and effect of The First Underwater Breaststroke Kick after start and turns
- Position of legs at the beginning of each kick
- Trajectory or Feet movement pattern during kick
- Action of knees and hip/body during kick

# Analyses of Armstrokes

- Compare first Strokes after starts and turns (they are different)
- Compare The last strokes before turns and finishing (they also differ)

# Stroke Rate -SR

## Distance per Stroke (stroke length) -SL

- Precise measuring Slow & Fast Stroke rate 20 – 80 per/min ( duration of each full stroke cycle)
- Count amount of strokes per lap – support self-control counting
- Display value of each stroke rate on screen and perform rhythm sound accordingly
- Measure and display value of Distance per Stroke (length of forward movement during each stroke cycle)

# Analyses of Breathing

- Using video we can see three elements of breathing : inhale- holding breath - exhale ( bubbles under water)
- We can analyze non breath and inclining body during side breath
- Timing of breathing actions with movements: - inhaling during preparation, recovery actions, keeping breath & exhale– during powerful phases

## More video analyses...

- Forward speed of body (by phases & elements)
- Stroke , kick recovery, gliding, flying, patterns ( compared your own body and compared to water)
- Speed and acceleration of hand along stroke pattern
- Distance of gliding, length of jumping
- Durations of reaction, take-off, flight, rotation, push, pull, recovery, catch,
- Angles and positions (body, hip, knee, ankle, shoulder, elbow, wrist , take-off, pushing)

# Detailed analyses of Relay Takeover

- Official time measured during events  $> -0,03$  sec  
(Time between hand touch and feet leave the wall )
- Time 5m before + 5m after takeover by head (underwater)
- Time 2,5m before + 2,5m after takeover in/out by head  
(above water)
- Takeover time (hands touch-hands entry)-
- Finishing swimmer's time and speed 5m before takeover  
touch (underwater)
- Timing of preparation actions of jumping swimmer (time  
between hip pass vertical line of block until feet leave the  
block)
- Flight speed and length of jump (above)
- Hands entry speed (under)



# Using video analyses feedback sessions for Coaching technical skills

Swimmer together with coach

Coach create quality to see unnecessary movements and mistakes!

Swimmer see difference between reality and feeling

- Feedback helps understanding , recognition technique elements – details !
- Make decisions about Correction actions –
  - Visual feedback helps to transfer new knowledge to Kinesthetic feeling

## ...Coaching technical skills

- Visualization – using slow motion video play and still frames – create Visual memory !
- Discussion, comments, explanation, - create ideas, suggestions – memorize Technique requirements !
- Listen sounds & recognize rhythm – create Acoustical memory !

# Creating imagery during feedback sessions

- Display drawings and data when measuring parameters on screen synchronized with images - times, positions, angles, distances, speeds, accelerations... STROKE Rate, STROKE Count- Kick Rate, Kick Count synchronized with running video
- Use screen recording to save analyses explanation and discussions during analyses
- Replay and look your original and screen recorded clips before training sessions using Smartphone, Tablet, Laptop or Desktop – prepare yourself for the next training !

# Creating kinesthetic memory immediately after Videoanalyses

- Kinesthetic exercises in dry land and in water
  - concentrated attention to requirements of important selected key elements using comfort / fast speed, separate drill and full coordination laps

Imitation body, arms , legs - positions and exercising swimming movements create Kinesthetic muscle memory

# Planning videoanalyses

- FOR ELITE SWIMMERS group : Do Regularly Video Testing – Analyses :
  - at the beginning of autumn preparation period ( Sept.-Oct.)
  - at the beginning of spring preparation period ( Feb.-March.)
  - during tapering period

# Summary

- This kind of testing and video analyses is part of Technical preparation for Elite swimmers
- Scientific – applied :
  - measuring parameters
  - objective evaluation
  - systematic comparison & developing
  - integrated practice & mental Technique training
  - develop skills of styles, starts and turns !

# Thank You

