

Advanced Biomechanics Applied to High Performance in Karate in Collaboration with STT Systems

The Real Federación Española de Karate (RFEK), in its ongoing commitment to sporting excellence, innovation, and the improvement of competitive performance, has driven the implementation of a state-of-the-art biomechanics laboratory focused on the analysis of modern Karate, in both Kata and Kumite.

In the current landscape of elite sports, where performance is decided by the smallest temporal, spatial, and technical margins, objective data-driven decision-making has become a critical factor. Under this premise, the RFEK has committed to integrating advanced motion analysis technologies that transform qualitative observation into quantifiable, reliable, and accessible information for athletes and coaching staff.

A Comprehensive and Customized Solution

The system developed by STT Systems is not merely a recording tool. It is a unified technological ecosystem that intelligently integrates various solutions to convert human movement into high-value data. Its main components include:

- **High-Precision 3D Capture:** A system based on 12 PRIME 13 cameras operating at 240 Hz, allowing for an exact three-dimensional reconstruction of every executed technique.
- **Inertial Sensors and High-Speed Video:** Full synchronization to obtain kinematic and rotational data in real-time, expanding analysis beyond what is visible to the naked eye.
- **Exclusive Karate Module:** Specific software that allows for the comparison of an athlete's actual execution against ideal 3D models, identifying technical deviations that previously went undetected by traditional methods.

Key Benefits for High Performance

The incorporation of this technology provides the technical team with objective indicators that strengthen decision-making in both training and competition:

- **Technical Optimization:** Exact measurement of strike acceleration and biomechanical efficiency during transitions.
- **Injury Prevention:** Analysis of balance, body alignment, and stability to detect risk patterns before an injury occurs.
- **Automated Reporting:** Generation of quantitative data to evaluate athlete progression and compare long-term results.
- **Stability in Kata and Power in Kumite:** Objective evaluation of the base of support and the kinetic chain involved in impacts, providing measurable criteria for technical performance.



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As noted by the Federation's technical team, for the first time, it is possible to objectively explain, justify, and reproduce why a technique does not reach expected efficiency or why stability is lost during execution, turning biomechanical analysis into a strategic tool for continuous improvement.

A Step Toward the Future

The Real Federación Española de Karate views biomechanics not as an isolated action, but as a structural pillar of modern training. The progressive integration of these technologies into daily sports preparation—developed and implemented in collaboration with STT Systems—will extend these benefits from youth categories to the absolute elite.

This initiative, supported by benchmark technological solutions in the field of biomechanical analysis, reinforces the RFEK's position as an entity aligned with science, innovation, and applied sports technology, consolidating a sustainable competitive advantage on the international stage and laying the foundations for the Karate of the future.

EL PRESIDENTE DE LA REAL FEDERACIÓN
ESPAÑOLA DE KARATE Y D.A.



- Antonio Moreno Marqueño -