



# SmartPower technology for the formation of martial arts shok actions

UDC 796.012



PhD, Associate Professor **M.Y. Stepanov**<sup>1</sup>

PhD, Associate Professor **M.B. Salamatov**<sup>2</sup>

<sup>1</sup>Tchaikovsky State Academy of Physical Culture and Sports, Tchaikovsky

<sup>2</sup>Russian State University of Physical Education, Sports, Youth and Tourism (SCOLIPE), Moscow

Corresponding author: mishanya81\_81@mail.ru

## Abstract

**Objective of the study** was to substantiation of the effectiveness of SmartPower technology in percussion martial arts.

**Methods and structure of the study.** SmartPower technology is based on load analysis, manifested in the form of vector forces. Its main task is to develop the power of sports movement through a system of exercises. The innovative technology of forming vector forces is based on an information database obtained using a computer program from the inertialess simulator KIT-70, trackers HYKSO, BIODEX, dynamic bag Kicktest-100. To evaluate the effectiveness of the technology, an experiment was conducted in the city of Chaikovsky on the basis of USK "Burevestnik". The participants were 38 thaiboxers aged 14-15, divided into two equal groups CG and EG, 19 athletes in each. The EG studied according to the proposed technology, the CG according to the program for the Youth Sports School.

**Results and conclusions.** Training in the EG under the control of exercises that maximally simulate shock actions using KIT-70 contributed to significantly significant changes in all the studied parameters. The technology, built on interconnected sets of exercises with an optimal effect on the vector effort, will allow achieving the planned sports result not only in martial arts, but also in other speed-strength sports.

**Keywords:** SmartPower technology, vector effort, control and measuring simulator (KIT-70), Hykso tracker, dynamic boxing bag (Kicktest-100), heart rate variability, Polar H-10 heart monitor.

**Introduction.** The modern technological process of training athletes should be based on constantly updated knowledge of anatomy, histology, biochemistry, physiology, biomechanics, psychology, adaptation mechanisms, sports and pedagogical principles. Within the framework of new scientific directions, many empirical pedagogical provisions have become outdated, such as, for example, the development of physical qualities, an adaptive reserve, a cumulative effect (V.N. Seluyanov, 2008), the problem of training transfer (A.P. Bondarchuk, 2007).

To form the shock actions of combatants, taking into account the positive transfer of fitness, SmartPower technology was proposed. SmartPower technology is an interconnected ordered system of exercises with an optimal effect on the vector effort to ensure the planned sports result.

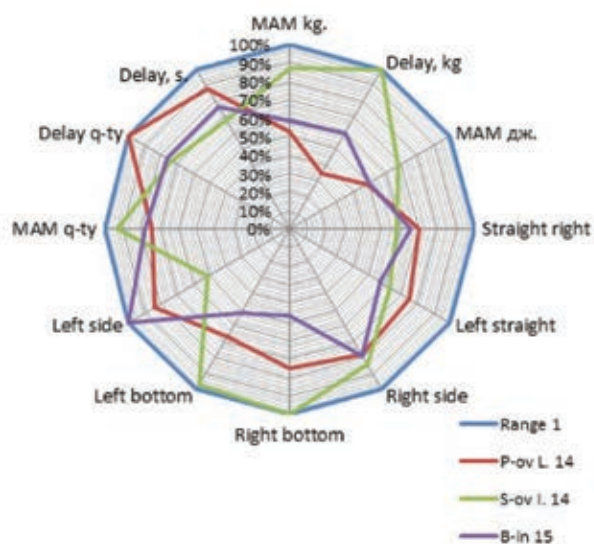
**Objective of the study** was to substantiation of the effectiveness of SmartPower technology in percussion martial arts.

**Methods and structure of the study.** The theoretical basis of the technology for the formation of shock actions SmartPower was the provisions of the sports adaptology of V.N. Seluyanov, block periodization by V.B. Issurin, artificial control environment I.P. Ratov, the principle of conjugate training effects proposed by Yu.V. Menkhin and modified by A.P. Bondarchuk.

The innovative technology for generating vector forces is based on an information database obtained using a computer program from the inertialess simulator KIT-70 (patent No. 2607310), trackers HYKSO, BIODEX, dynamic bag Kicktest-100 [3]. The information base includes: the magnitude of the force to be overcome, the angular velocity, acceleration, movement speed, power, pace, amplitude, force and sharpness of the strike. Dynamic assessment of vector efforts allows you to purposefully influence the training process depending on its stage, and the individual profile of an athlete to assess his strengths and weaknesses.

To assess the effectiveness of the technology, an experiment was conducted in the city of Chaikovsky on the basis of the USC “Burevestnik” from 09/01/2021 to 02/01/2022. The participants were 38 Thai boxers aged 14-15, divided into two equal groups - CG and EG, 19 athletes in each. The EG studied according to the proposed technology, the CG - according to the program for the Youth Sports School.

Picture 1 shows the punching profile of three 14-15 year old Thai boxers.



**Picture 1.** Individual punching profile of three Thai boxers aged 14-15

The first row in the form of a diagram perimeter is built on the basis of the maximum data shown by a group of Thai boxers aged 14-15, consisting of 67 people, and it is accepted as a model. In the presented individual profile, the following athletes achieved model characteristics (Picture 1). The athlete (P-ov L. 14) performed 110 strokes while holding his breath. The athlete (S-ov I. 14) did 17984 kg of work while holding his breath, and the right one from below amounted to 318 kg. The athlete (B-in 15) had the strongest left side kick of 279 kg. The other indicators of the athletes

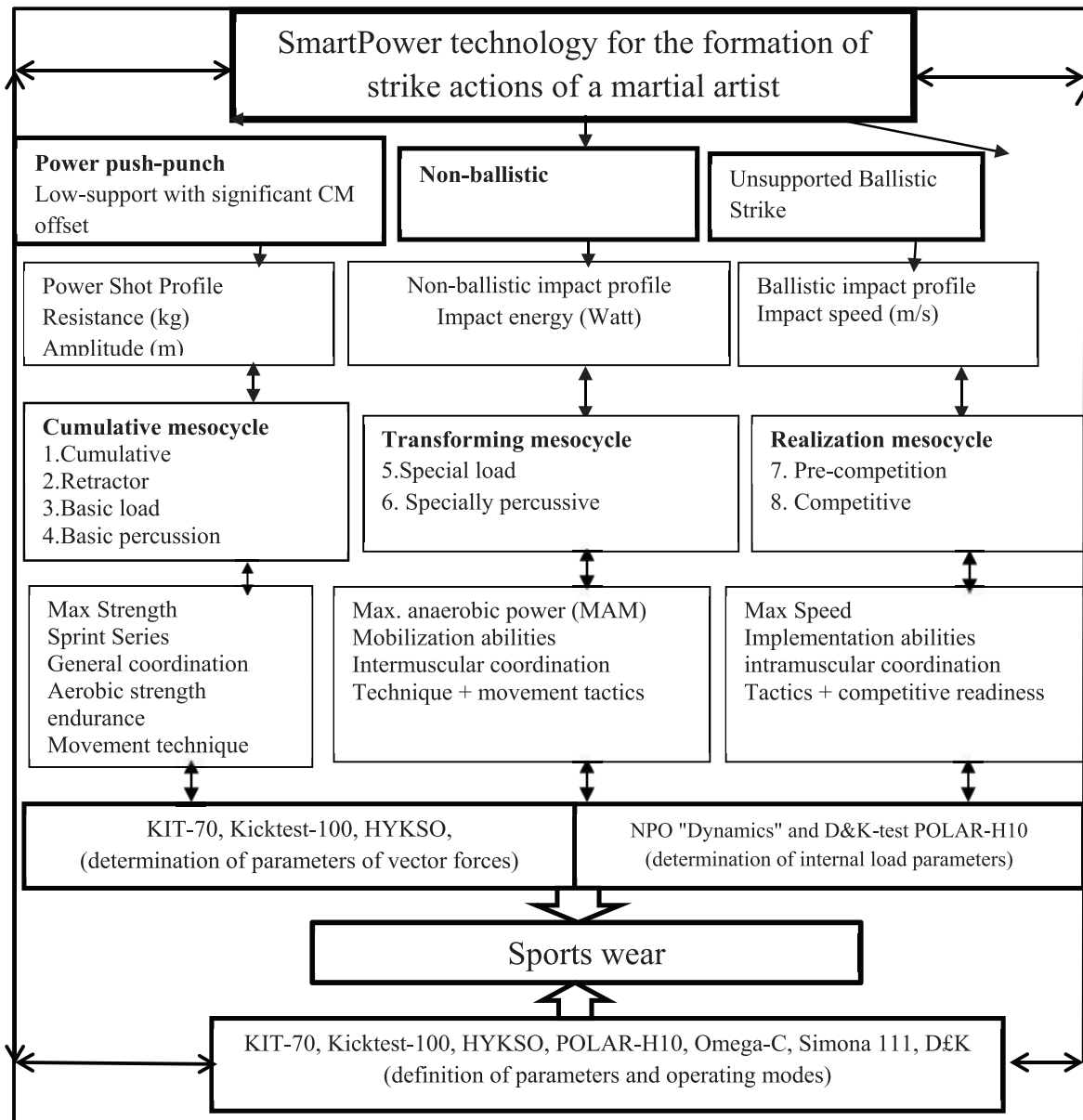
were below the model. The indicators of the power of percussion actions with both hands were obtained using the KIT-70, the strength and power of single punches with the hands, as well as their number and strength while holding the breath using the dynamic bag Kicktest-100.

At the same time, control over the external manifestation of vector efforts was carried out taking into account the internal reaction of the athlete’s body. Assessment and analysis of the body’s response to the load were recorded using Polar-H10 heart monitors, with the Polar Team software, the NPO «Dynamics» software and hardware complex, and D&K-test multifactorial express diagnostics. These tools made it possible to record the following indicators: average heart rate and maximum heart rate (taking into account their distribution by intensity zones), heart rate variability (HRV) is represented by indicators of TI (tension index), TR, VLF, LF and HF (wave spectrum power), indicators delta ECG according to Dushanin. Internal control over the external manifestation of vector forces allows you to optimally dose the load in the microcycle.

SmartPower technology consists of three mesocycles: accumulation, implementation and transformation (Picture 2). Mesocycles should be divided into power-jogging, accentuated and high-speed. The proposed scheme of mesocycle blocks, aimed at achieving specific goals, whether it be strength, sharpness, strike speed, speed of decision-making, expressed in specific quantities (kg, m/s, sec.), allows using the principle of training transfer and conjugation of training effects with taking into account residual training effects and motor asymmetry. A correctly set task allows you to dose training exercises according to the athlete’s individual motor profile, purposefully managing the process of adaptation to loads, developing “strong” or compensating for “weak” sides of martial arts preparedness.

*Indicators of biomechanical characteristics of punching actions of boxers from the CG and the EG after the experiment*

№ п/п	Indicators	Study Groups		p
		KG (M ± m)	EG (M ± m)	
1.	Direct shock MAM (watt/s)	13,24±0,62	23,53±0,57	<0,05
2.	Direct impact speed (m/s)	3,69±0,06	7,08±0,08	<0,05
3.	Side impact MAM (watt/s)	17,97±0,10	27,19±0,10	<0,05
4.	Side impact speed (m/s)	3,19±0,02	5,90±0,02	<0,05
5.	MAM kick (Watt/s)	3,24±0,07	6,11±0,07	<0,05
6.	MAM direct impact sitting on a chair (watt / s)	6,12±0,02	12,01±0,02	<0,05
7.	Direct impact speed while sitting on a chair (m/s)	2,77±0,08	4,41±0,02	<0,05



**Picture 2.** Technology of formation of shock actions in martial arts

The software allows you to solve a wide range of tasks related to the control, measurement and analysis of data in real time. With the help of KIT-70, the power profile of all competitive movements is estimated. The stage of preparation and the functional state of the athlete will determine the mode of the selected resistance when working with KIT-70 [4]. The main task of training is to increase the power of competitive movement with various resistances [3].

**Results of the study and their discussion.** At the end of the experiment, the athletes were tested for the biomechanical characteristics of impact actions (see table).

**Conclusions.** Training in the EG under the control of exercises that maximally simulate shock actions

using KIT-70 contributed to significantly significant changes in all the studied parameters. The technology, built on interconnected sets of exercises with an optimal effect on the vector effort, will allow achieving the planned sports result not only in martial arts, but also in other speed-strength sports.

**References**

1. Bondarchuk A.P. Upravlenie trenirovochnym processom sportsmenov vysokogo klassa [Management of the training process of high-class athletes]. Moscow: Olimpiya Press publ., 2007. 272 p. ISBN 5-94299-110-3.
2. Salamatov M.B., Stepanov M.Y. Ocenka tekhn...



- nicheskikh dejstvij v trenirovochnoj i sorevnovatelnoj deyatelnosti kikkбоксеров на основе трекеров Hykso [Evaluation of technical actions in the training and competitive activities of kickboxers based on trackers Hykso]. Fizicheskaya kultura: vospitanie, obrazovanie, trenirovka. 2019. No. 4. pp. 18-20.
3. Salamatov M.B., Stepanov M.Y. Razvitie skorostno-silovyh sposobnostej sportsmenov 11-13 let po tajskomu boksu s pomoshchyu trenazherov s obratnoj svyazyu [Development of speed-strength abilities of athletes aged 11-13 in Thai boxing using trainers with feedback]. Fizicheskaya kultura: vospitanie, obrazovanie, trenirovka. 2019. No. 5. pp. 72-75.
  4. Seluyanov V.N., Sarsania S.K., Sarsania K.S. et al. Kontrol fizicheskoy podgotovlennosti futbolistov v sportivnoj adaptologii [Control of physical readiness of football players in sports adaptology]. Teoriya i praktika fiz. kultury. 2008. No. 5. pp. 36-39.
  5. Stepanov M.Y., Yakupov A.M., Maltsev G.S. et al. Metodika formirovaniya udarnyh dejstvij bokсеров 12-14 let s ispolzovaniem sredstv kontrolya vektornyh usilij [Technique for the formation of shock actions of boxers aged 12-14 years using means of controlling vector efforts]. Tchaikovsky: Tchaikovsky State Institute of Physical Culture publ., 2021. 128 p.
  6. Stepanov M.Y., Salamatov M.B. Trenirovka bokovykh udarov s ispolzovaniyem bezynertsionnogo trenazhera «Parus» [Training of side impacts using the inertialess simulator «Sail»]. Fizicheskaya kultura: vospitaniye, obrazovaniye, trenirovka. 2019. No. 3. pp. 14-16.
  7. Stepanov M.Y. Patent № 2464061 C1 Rossijskaya Federaciya MPK A63B 21/018. Ustrojstvo dlya trenirovki sportsmenov i sposob ego primeneniya [Patent No. 2464061 C1 Russian Federation IPC A63B 21/018. Device for training athletes and method of its use]. No. 2011136333/12; appl. 08.31.2011, publ. 20.10.2012.
  8. Yakupov A.M., Stepanov M.Y. Metodika formirovaniya udarnyh dejstvij v bokсе [Technique of formation of shock actions in boxing]. Teoriya i praktika fiz. kultury. 2014. No. 9. pp. 77-82.