

# DEVELOPMENT OF MODEL PERFORMANCE TECHNOLOGY PERFORMANCE SHOT AIR RIFLE WITH CONSIDERATION OF COMPETITIVE ACTIVITY



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**Keywords:** *model characteristics; Shooting; pulsometry; simulator SCATT.*

**Summary.** The paper presents methods for modeling characteristics athlete shooting with a combination of data and indicators simulator SCATT cardiac monitoring.

### РАЗРАБОТКА МОДЕЛЬНЫХ ХАРАКТЕРИСТИК ТЕХНИКИ ВЫПОЛНЕНИЯ ВЫСТРЕЛА ИЗ ПНЕВМАТИЧЕСКОЙ ВИНТОВКИ С УЧЕТОМ АНАЛИЗА СОРЕВНОВАТЕЛЬНОЙ ДЕЯТЕЛЬНОСТИ

**Ключевые слова:** *модельные характеристики, пулевая стрельба, пульсометрия, тренажер СКАТТ.*

**Аннотация.** В статье представлены методы получения модельных характеристик спортсмена в пулевой стрельбе при совмещении данных тренажера СКАТТ и показателей кардиомониторинга.

**Introduction.** Since 1971 the European championships of shooting from airguns have been annually held among men, women and juniors. Since 1984 shooting from airguns became a part of the Olympic program. Over the last years one of the important changes is introduction in the 1986 final championships in all exercises of the Olympic program and accordingly finals' debut on the Olympic XXIV Games in Seoul in 1988. Besides this over the last two/three decades there was a technical revolution in equipping the shooters in shooting. All of this reflected the results. Nowadays the

records of the world, Europe and Russia in men's and women's shooting from the airgun equal to the absolute result of 600 points out of 600 and of 400 out of 400. Often the winners and awardees of the official international competitions separate only one or two decades points. Such a fierce rivalry requires the deeper approach to the training process of the athletes, especially at junior level of Russian national team.

The purpose of the research was to identify the dynamics of competition level of the qualification and the final results on the major international

Table 1

The results of the qualification in shooting from air rifle in competition VP-4 among women on the international competition

Соревнования	1-е место		2-е место		3-е место		8-е место	
	Квал.	Финал	Квал.	Финал	Квал.	Финал	Квал.	Финал
1986 МС	393	99,0	392	99,0	387	97,7	381	89,4
1988 ОИ	395	103,5	393	104,5	394	101,8	394	99,0
1992 ОИ	396	102,2	396	99,3	393	102,1	393	98,6
1996 ОИ	395	102,6	397	100,4	395	102,2	394	100,2
2000 ОИ	395	102,7	397	100,5	394	103,2	394	99,1
2004 ОИ	398	104,0	399	102,5	398	103,1	396	101,2
2008 ОИ	400	103,5	399	103,1	399	101,9	397	98,7
2010 ЧМ	400	105,6	398	103,4	398	103,0	398	100,1
2011 ЧЕ	399	102,3	399	102,2	397	104,0	397	101,4

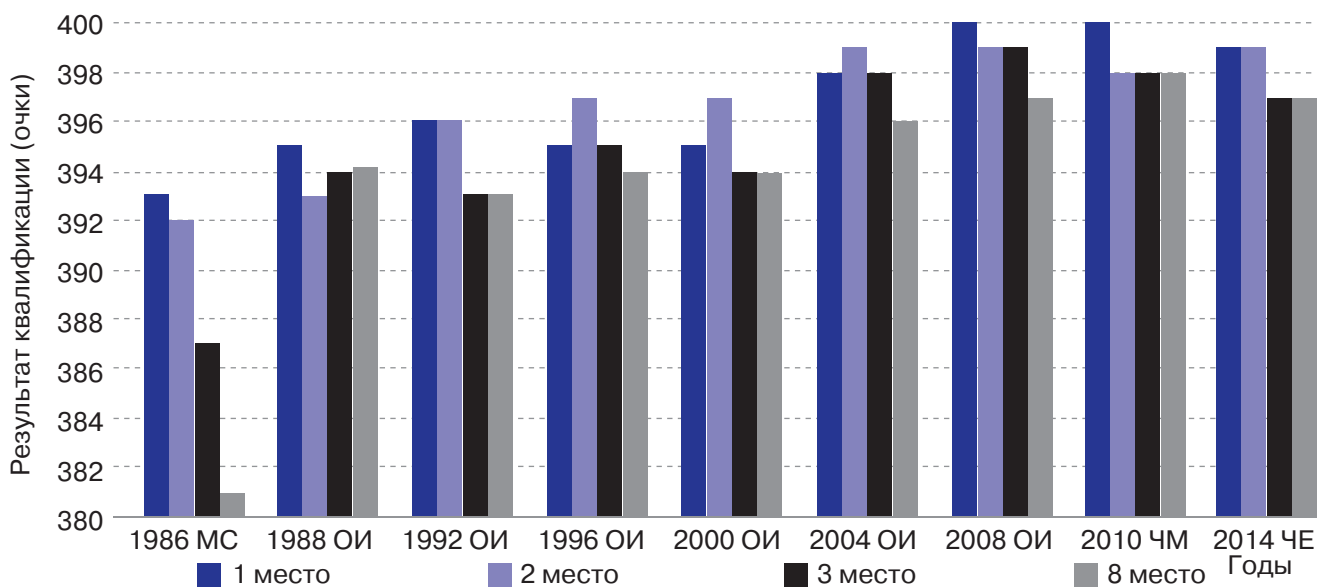
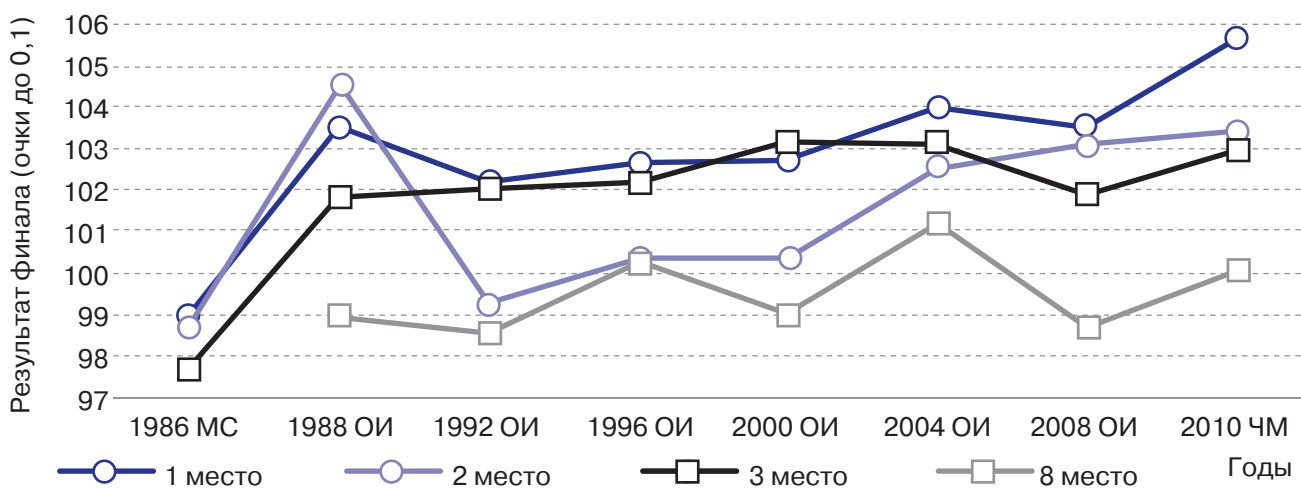


Fig. 1. The dynamics of the results of qualification and final series of women in official international competitions after the introduction of the finals. OG - Olympics, WC - World Cup UEFA - European Championship, IC - International Competitions

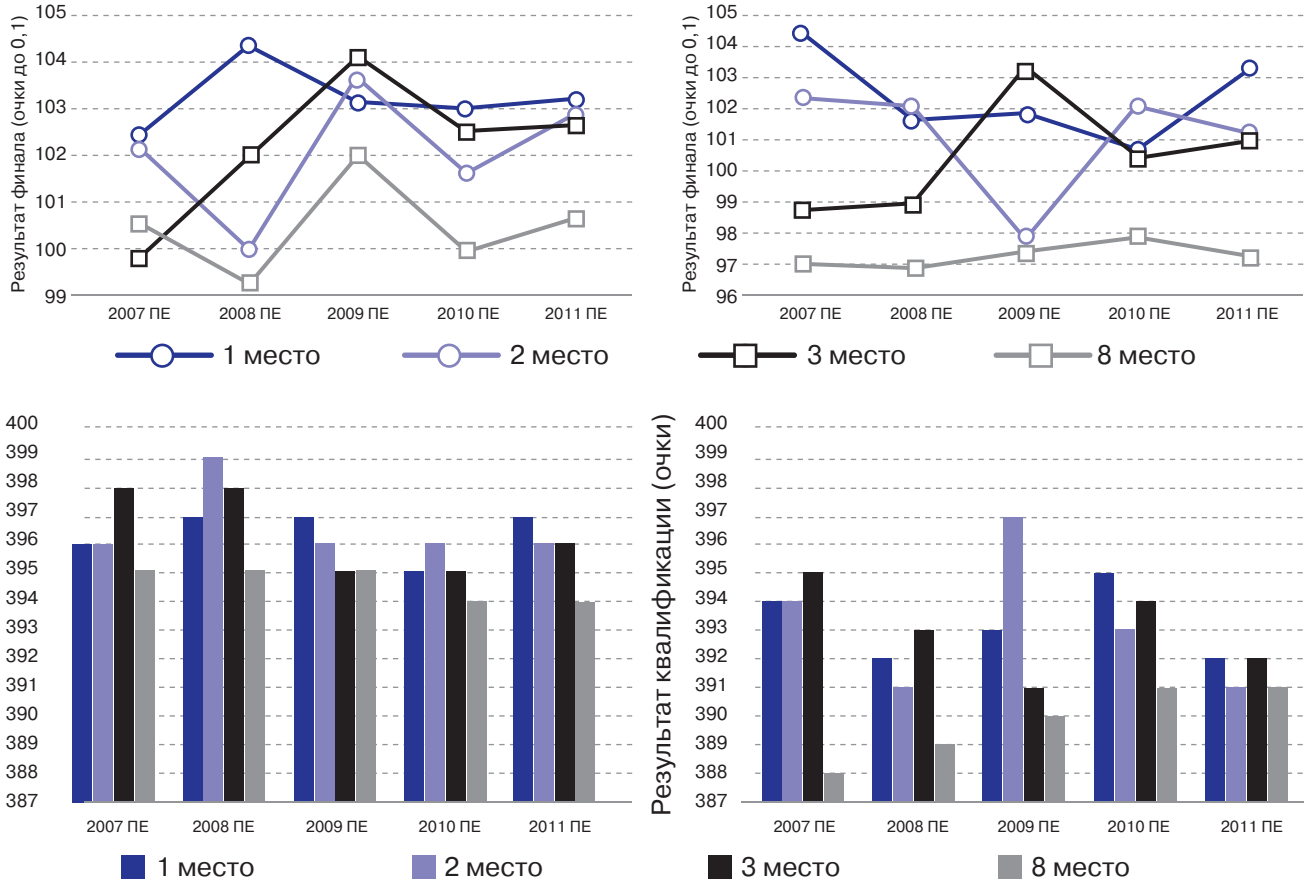


Fig. 2. Comparison of the dynamics and the final results of the qualification series for juniors at the European Championship (PE) and Russia (OL)

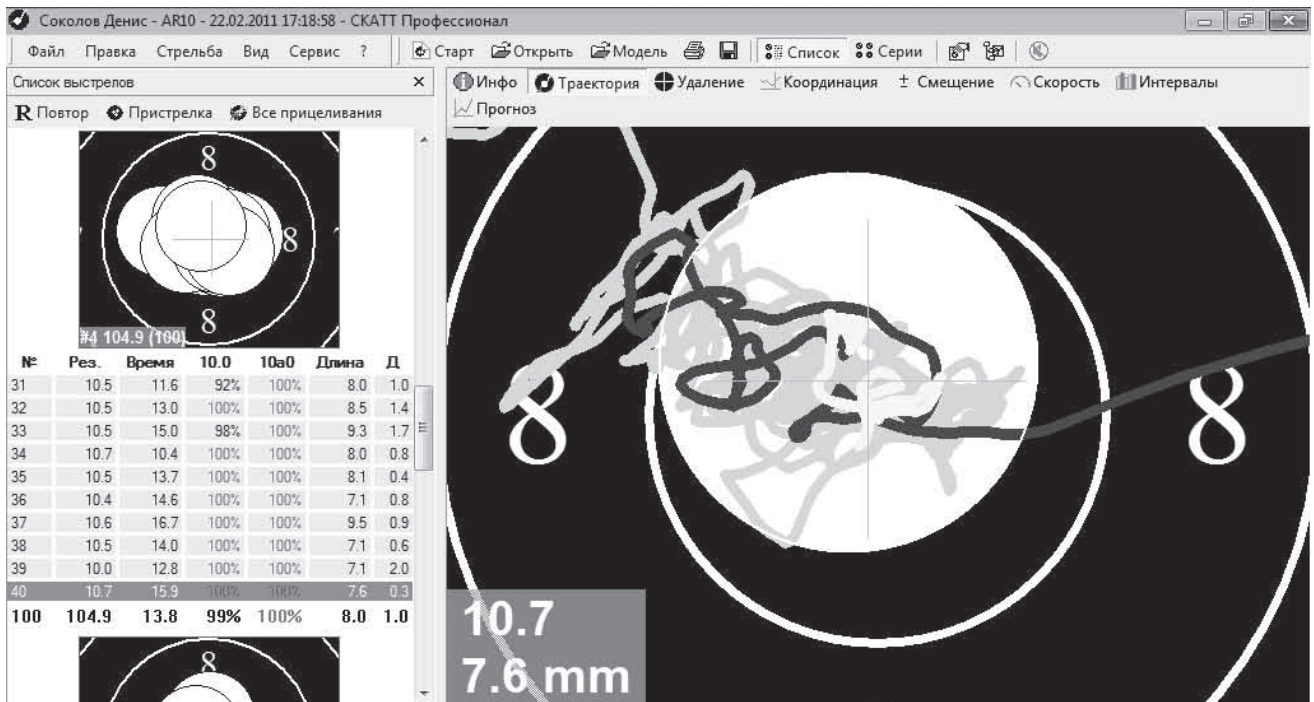


Fig. 3. Example trajectory oscillations before the shot with a reliable medium resistance to «10.0» and with precision aiming (light line) and good retention after the shot (dark line)

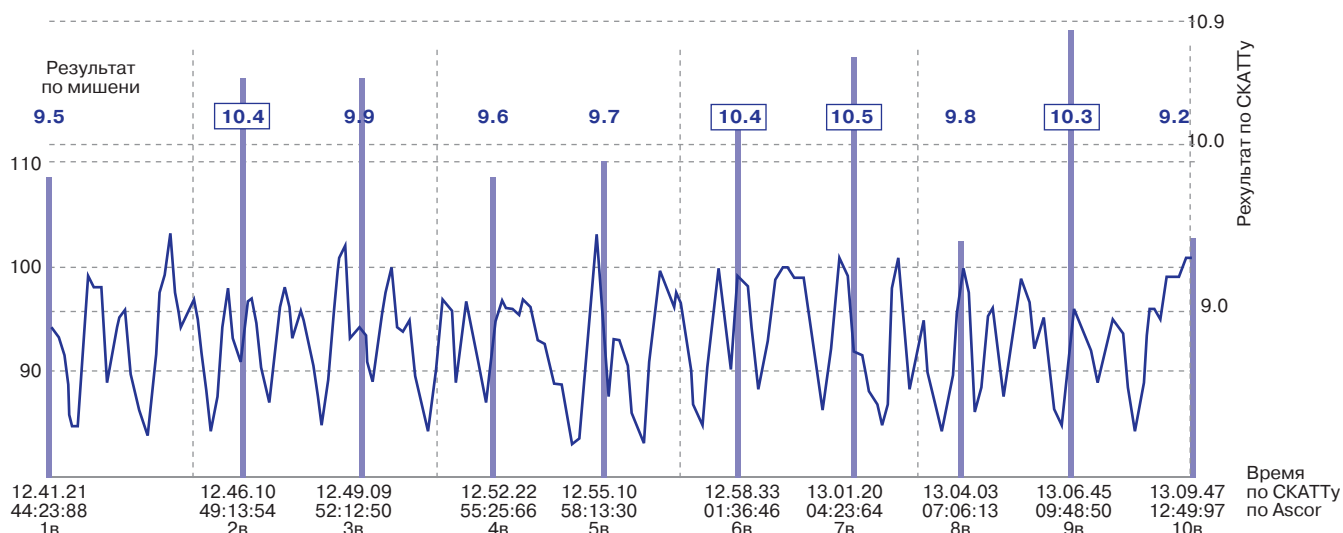


Fig. 4. Combining graphics and charts heart rate intervals between shots – (according to the program SCATT)

competitions and to determine the most significant parameters of the model characteristics of the shoot technic.

The methods of the research: the analysis of the scientific and educational literature, the analysis of the competition's protocols since 1986 till present, pedagogical observation, questioning, timing, pulsometry, testing on the computer simulator SCATT and control shooting, statistical analysis.

The results of the research. The generation of the results of the competitions, observed since the introduction of the results, in which after the qualification exercise (60 and 40 scoring shots in men and women respectively), top 8 athletes produce 10 more shots based on decades of a point, which are added on to the qualification results, and on the one final shot 75 sec. are given. As an example we show you the summarized results of women in shooting from air rifle after the introduction the finals on the major international competitions (watch the table) and corresponding diagram (fig. 1).

For the analyses the exercise of airgun was chosen, because it is done in a room where the weather conditions don't influence on the result. At first we can see, that while the introduction of the finals they did not affect the distribution of leaders of qualifications as the gap between the 1st and 8th place was big. Then the level of the results increased not only among one or two world-class leaders, but also among the top ten of the world rank, and as the results of the qualifications the difference between the 1st and 8th places was 2–3 points. The role of the final series highly increased, and

after the successful doing of them the athletes from the final closing locations were able to fight for the podium. We got a similar picture when analyzing the results for men. With them the results of Russian juniors lag behind the international level (fig. 2)

According to the data nowadays the victory on the major international competitions is possible with superiority on the final series not less than 104.0. As long as nowadays the difference in the final is rarely more than 2 points, highly skilled athletes must possess the ability to perform a shot at the target center. For this is not enough to have good resistance characterized path length (L) (figure small simulator SCATT) [2]. According to our researches the important indicators are: the stability of sight (to be considered a valid change within  $\pm 1,5s$ ), average stability within the software to enter «10.0» in conjunction with the precision aiming, when the virtual and the real holes are in the same area, housed trajectory oscillations before the shot (distance JEM not more than 1 mm) (see fig. 1).

However we found the interrelation, characterizes the quality of the shot, determines the nature of HR at the moment of firing (fig. 4)

Analysis of combining time shot diagrams and its dignity with the schedule pulsometry a number of leading Russian team shooters and highly qualified athletes shooters of junior age led to the conclusion that the most reliable on the «centrality» should be considered a shot that produced at a reduced heart rate, but not necessarily at its minimum value. It is naturally, because with this technique of run shot the

«tuning» of the body in the system of shooter-weapon is saved that promotes «work for a shot», or retain the rifle after the shot. This in its turn increases the reliability of performance of «tens expensive».

According to the diagramm of the time of the shot and its dingnity, combined with the schedule pulsometry, only the 7th shot for this shooter with his level of training can be considered the qualitatively perfomed. The rest of the shots can be considered only conditionally technically correctly perfomed (fig. 4).

### Output

To win the major international competitions it is necessary to have superiority in the final series, which must be not less than 104.0.

1. While preparing the shooters it is important to pay attention to imporing the stability of time-run shot (range between 1.5 sec.), the average stability within ensure 100% hitting in “10.0” and aiming accuracy – JEM no more than 1 mm.

2. It is considered to assume the shot, produced at a rediced heart rate.

### Literature

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