

ANALYSIS OF SPEED RUNNING AND INDEX OF POLES USED BY FINALISTS OF POLE VAULT JUMPING IN 2014 NATIONAL CHAMPIONSHIP FINAL

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ABSTRACT. Pole vault jumping is one of the most complex athletic events. The level of each athlete on physical qualities are considered a condition sine qua non in achieving high-level results in pole vaulting. Determinate the specific speed parameters on the last part of the approach and grip characteristics of hardness and height used by the finalists in 2014 Senior National Championship. The speed parameters on last part of the approach were measured with Microgate Time Racer2, a device consisting of three pairs of placed photocells. Features of the poles used by the first three finishers in the National Championship Final were monitored during the competition. The first three finalists in 2014 Seniors National Championship Final, obtained specific speed parameters with values between 7.9 m/s and 8.8 m/s on the last 5 m of approach right before the take of phases and detachment. From the point of view of the used poles, they used poles with stiffness index, values between 75 kg and 82 kg. Grip heights were 4.50 m and 4.64 m. All these parameters led to crossing height between 4.85 m and 5.11 m by the first three finishers in the monitored contest. A higher value of speed parameters, hardness -elasticity and the grip of used pole have as repercussions the achievement of good results in the pole vaulting event.

Keywords: pole vaulting, speed running, Microgate

REZUMAT. Analiza vitezei pe elan și a caracteristicilor prăjinilor folosite de finaliștii probei de săritura cu prăjina la finala campionatului național 2014. Proba de săritură cu prăjina este una dintre cele mai complexe probe atletice. Nivelul fiecărui atlet privind calitățile fizice reprezintă o condiție absolut necesară în vederea atingerii unor rezultate cât mai bune în probă. Parametrii de viteză pe ultima parte a elanului au fost determinați cu ajutorul dispozitivului Microgate Time Racer 2, Caracteristicile prăjinilor folosite de primii trei clasai în finala Campionatului Național au fost monitorizate în timpul desfășurării concursului. Primii trei clasai în Finala Campionatului Național de seniori ediția 2014 au obținut parametrii de viteză specifică cu valori cuprinse între 7,9 m/s și 8,8 m/s pe ultimii 5 m de alergare pe elan, chiar înaintea fazei de prezentare și desprindere. Din punct de vedere al caracteristicilor prăjinilor folosite, aceștia au folosit prăjini cu indice de duritate cu valori între 75 kg și 82 kg. Înălțimea prizelor a fost de 4,50 m și 4,64 m. Toți acești parametrii

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au dus la trecerea peste înălțimi între 4,85 m și 5,11 m de către primii 3 clasai în concursul monitorizat. O valoare cât mai mare a parametrilor de viteză, duritate-elasticitate și priză a prăjinii folosite au repercusiuni în obținerea de rezultate bune la proba de săritură cu prăjina.

Cuvinte-cheie: săritura cu prăjina, viteză pe elan, Microgate

Introduction

Pole vault jumping is considered the most technical athletic track. The index with the greatest influence in determining the final performance it is held by the speed. When we talk about speed motor skills in pole vault jumping, we firstly refer to motion speed especially on the last part of approach (Schulek, 2002). Specific speed of pole vault jumping is the speed obtained by the athlete on the last 10 m of running before batting phase and detachment (Xuezhen Liu, Tiemin Zhou, 2008).

The highest level of this specific speed will ultimately lead to the ability to use high grids and poles with a high index of hardness and flexibility, the final result being to obtain the best results in the track. (Falk Schade, Juha Isolehto, Paavo Komi, 2005) Thus, the specific speed in pole vault jumping represents a limiting factor and favourable in the performance (Adamczewski, Horst/Kruber, Dieter, 1993).

Monitoring the specific speed indexes on the last part of approach in the finalists of pole vault jumping, seniors category, gives us a true picture of the parameters obtained by the most representative athletes of this track, on the national level, in terms of synergy between specific speed, characteristics of used pole and the result directly in the track (Zagorac N., Retelj E., & Katic R., 2008).

Material and methods

In order to determine the specific speed of pole vault jumping it was measured the speed on the last 10 m of momentum with Microgate Time Racer 2 device.

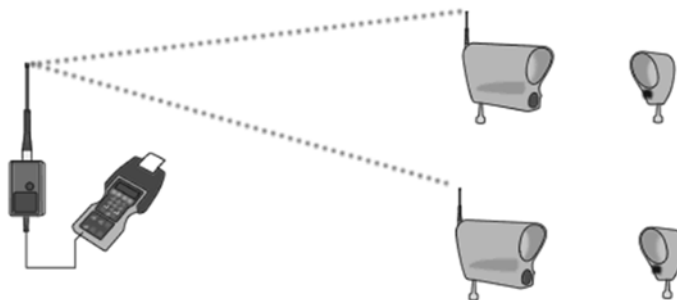


Figure 1. Microgate Racetimer 2 Device
(<http://www.microgate.it/Timing/Products/Kit-Racetime2-Light-Radio/Description>)

This device was used with three pairs of photocells placed on the last 10 m approach run as follows.

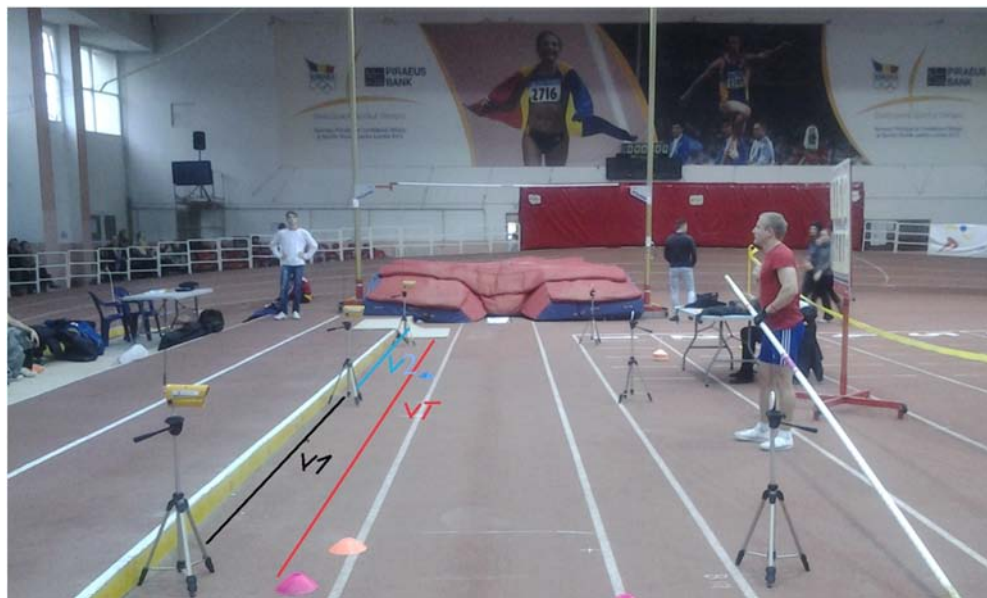


Figure 2. Microgate system in use at the National Championships

V_t - is the value of the overall speed meaning the monitored speed in the approach run range from last 10 m to 0 m.

V_1 - is the speed value in the approach run range from last 10 m to the point of beginning of the last 5 m

V_2 - is the value of the approach speed on the last 5 m of running

$V_1 - V_2$ - is the difference of speed parameters value between V_1 and V_2 and indicates the acceleration or deceleration on last part of the momentum of each competitor individually.

Result - is the result obtained by contestants during the competition where the approach speed was monitored

The values of speed parameters were calculated in m/s, monitored distance (m) being divided to the obtained time.

The research protocol

The research was conducted in conditions of competition even during the final National Championship of seniors in pole vault jumping. Monitoring the characteristics of hardness and length of used poles was visually performed and were taken into account

only the characteristics of the pole used to carry out the most valuable jump in terms of the result obtained in the track. Data on the specific speed were recorded during most valuable jumps in the competition.

Time and place of research

The research was conducted in March 8th, 2014 in the Indoor Athletics Hall "Lia Manoliu" during carrying out the pole vault jumping in senior-boys category of Romanian National Championships.

Subjects and plots

Data monitored over specific speed features

Table 1. Obtained results and place by the monitored subjects

Name	Date of birth	Obtained results	Obtained place
D.R.	28-Oct-93	5,15 m	place I
P.B.	3-Oct-85	4.85 m	place II
S.V.	18-May-94	4,80 m	place III

Applied tests

We measured the velocity of the top athletes on the last 10 m of the approach, using the Microgate system. In addition, we made the difference of the velocity on 0 to 5, from 5 to 10m and the main velocity on 0 – 10 m.

Results

Table 2. Specific speed parameters obtained by the monitored subjects

Athlete	Obtained place	Speed vt 10- 0 m	Speed v1 10- 5 m	Speed v2 5- 0 m	Difference v1 - v2	Result
D. R.	I	8,13 m/s	7,69 m/s	8,80 m/s	1,11 m/s	5,15 m
P.B.	II	7,57 m/s	7,14 m/s	8,06 m/s	0,92 m/s	4,85 m
S.V.	III	7,14 m/s	7,35 m/s	7,90 m/s	0,55 m/s	4,80 m

Table 3. Characteristics of poles used by the monitored subjects

Name	Obtained place	kg	Index of pole hardness (kg)	Index of pole length (m)	Result (m)	Index of specific speed (kg)
D.R.	I	70	82	4,65	5,15	12
P.B.	II	70	80	4,60	4,85	10
S.V.	III	71	80	4,60	4,80	9

Discussions

In terms of speed parameters specific to the athlete ranked first place, he reaches a speed on the last 5 m of the approach run of 8.80 m/s while the nearest competitor ranked second place reaches a specific speed index of 8.06 m/s and the competitor ranked third place fails to pass the threshold of 8 m/s and he gets a specific speed of 7.90 m/s. As it can be seen from the monitored data, the competitor who obtains the best result in the competition and the national champion in pole vault jumping, senior category in 2014, also obtains the highest value of specific speed parameters.

The same situation is also found when analyse the characteristics of the poles used by the three monitored subjects from the viewpoint of grip height and hardness index of the pole in relation to the own weight. The competitor ranked first place uses a pole with a hardness index of 82 kg compared to own weight of 70 kg and a grip of 4.65 m. The index of specific strength is of 12 kg. Index of specific strength on the other two athletes is 10 kg, respectively 9 kg.

Conclusions

From the results acquired following to the monitoring of the three subjects who obtained the most valuable results in the athletics championship final of pole vault jumping we could conclude that the subject D.R. ranked first place and who achieved a result of 5.15 m has the best indexes of specific speed and specific strength indexes of in the perspective of pole hardness used in relation to his own weight. The competitor ranked second place has the values of these monitored indexes lower than the competitor ranked first place.

The competitor ranked third place obtained the worst results in terms of both specific speed and in terms of specific strength index, all these with direct influence on the final outcome in the track. In order to obtain some better results in the track each of the three monitored competitors should on the one hand to improve the motion speed, particularly the speed on the last part of the approach run, this bringing, on one hand the possibility of using some poles with a greater hardness index and on the other hand, the use of higher grips with positive consequences on the final pole vault jumping test.

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