TOP SPEED FOR 100M HURDLERS



Gnima FAYE (SEN)

TOP SPEED FOR 100M HURDLERS



▲ 4th hurdle clearance by hurdlers with performance of 13.84 - 18.79 performance range (240 frames/sec)



Difference between 100mH and 100m a good indicator for technical efficiency ?

Hurdlers have shorter strides ?

Hurdlers have higher stride frequency ?

Better hurdlers reduce flight times ?





Difference between 100m hurdles and 100m bests for the World Record holders



TOP SPEED FOR 100M HURDLERS

Anneliese EHRHARDT (1968 - 1976) 16 sec 15 14 13 12 11 18 22 19 20 21 23 24 25 26

16 sec

Vera KOMISOVA (1970 - 1980)



Yordanka DONKOVA (1977 - 1988)



Sally PEARSON (2003 - 2015)



Age evolution at 100m hurdles and 100m for 4 olympic champions

100m

TOP SPEED FOR 100M HURDLERS

Progression of hurdling efficiency : « technicians »

Grazyna RABSZTYN pol

19	Age	27		
<u>1972</u>		1980	Progr	
13.14	100mH	12.36	0.78	
12.14	TUUM	11.42	0.72	
1,00	Efficienc	y <mark>0,94</mark>	=	

TOP SPEED FOR 100M HURDLERS

Progression of hurdling efficiency : « technicians »

19 Age 27 1972 1980 **Progr** 13.14 100mH 12.36 0.78 12.14 11.42 0.72 100m 1,00 Efficiency 0,94 =

Grazyna RABSZTYN pol

Yordanka DONKOVA bul

18	Age	26	
<u>1980</u>		1988	Progr
13.24 12.17	100mH 100m	12.21 11.20r	1.03 0.97
1,07	Efficiency	1,01	=



TOP SPEED FOR 100M HURDLERS

Progression of hurdling efficiency : « sprinters »



Gail DEVERS usa

TOP SPEED FOR 100M HURDLERS

Progression of hurdling efficiency : « sprinters »



Gail DEVERS usa

Lolo JONES usa

18	Age	26	
<u>2001</u>		2008	Progr
13.31 11.51	100mH 100m	12.43 11.24*	0.88 0.27
1,80	Efficienc	y 1,19	+



TOP SPEED FOR 100M HURDLERS

Stride parameters prerequisites for female hurdlers

Step length between 5th and 6th hurdle

Sub Step	j	Pearson	Carruthers	Harper	Porter	М
1 step	m	1.60	1.39	1.66	1.49	1.54
length		(30.9%)	(27.0%)	(30.6%)	(27.4%)	(29.0%)
2 step	m	1.88	2.08	2.12	2.18	2.07
length		(36.4%)	(40.5%)	(39.0%)	(40.1%)	(39.0%)
3 step	m	1.69	1.67	1.65	1.77	1.70
length		(32.7%)	(32.5%)	(30.4%)	(32.5%)	(32.0%)
Total length	m	5.17	5.14	5.43	5.44	5.30

Kinematic analysis of 100-m women's hurdles at WC 2011 (Jae-Kyun Ryu)



TOP SPEED FOR 100M HURDLERS

Stride parameters prerequisites for female hurdlers

Step length between 5th and 6th hurdle

Sub Step	j	Pearson	Carruthers	Harper	Porter	М
1 step length	m	1.60	1.39 (27.0%)	1.66	1.49 (27.4%)	1.54 (29.0%)
2 step length	m	(36.4%)	(21.070) 2.08 (40.5%)	2.12 (39.0%)	2.18 (40.1%)	2.07 (39.0%)
3 step length	m	1.69 (32.7%)	1.67 (32.5%)	1.65 (30.4%)	1.77 (32.5%)	1.70 (32.0%)
Total length	m	5.17	5.14	5.43	5.44	5.30

Kinematic analysis of 100-m women's hurdles at WC 2011 (Jae-Kyun Ryu)

Stride length at top speed for hurdlers

(Sub 12.60 performers during 100m or relay)

Cindy BILLAUD fra	2m00
Vera KOMISOVA urs	2m07
Ginka ZAGORCHEVA <i>bul</i>	2m08
Patricia GIRARD <i>fra</i>	2m10
Priscilla LOPES-SCHLIEP can	2m13
Kelly WELLS <i>usa</i>	2m14
Sally PEARSON aus	2m17
Lolo JONES usa	2m22
Yordanka DONKOVA <i>bul</i>	2m22
Cindy OFILI gbr	2m23
Gail DEVERS <i>usa</i>	2m27
Michelle PERRY <i>usa</i>	2m32

TOP SPEED FOR 100M HURDLERS



TOP SPEED FOR 100M HURDLERS



TOP SPEED FOR 100M HURDLERS



Biomechanical analysis for 2005 : Australian Institute of Sports - Movement Science

Kinematic parameters changes at top speed for Sally PEARSON

Age	Date	100m H	<u>100m</u>	Max speed m/s	SL m	SF hz
18	2005 NC	13.41	11.67	9,9	2.15	4.61
24	2011 WC	12.28	10.07r	10,3	2.17	4.76

TOP SPEED FOR 100M HURDLERS

Relation between fastest interval during 100m H and max sprint speed



TOP SPEED FOR 100M HURDLERS

Relation between fastest interval during 100m H and SL at max sprint speed



TOP SPEED FOR 100M HURDLERS

Relation between fastest interval during 100m H and SF at max sprint speed



TOP SPEED FOR 100M HURDLERS



TOP SPEED FOR 100M HURDLERS

Progression of interval rhythm : « technicians »

Grazyna RABSZTYN pol

19	Age	27	
<u>1972</u>		1980	<u>Progr</u>
1.04	Interval	0.95	
0.31 0.73	Flight Run	0.27 0.68	45% 55%

TOP SPEED FOR 100M HURDLERS

Progression of interval rhythm : « technicians »

 19
 Age
 27

 1972
 1980
 Progr

 1.04
 Interval
 0.95

 0.31
 Flight
 0.27
 45%

Run

0.73

Grazyna RABSZTYN pol

0.68

55%

Yordanka DONKOVA bul

18	Age	26	
<u>1980</u>		1988	Progr
1.04	Interval	0.94	
0.31	Flight	0.29	20%
0.73	Run	0.65	80%
1	C. 121 C. 19		



TOP SPEED FOR 100M HURDLERS

Progression of interval rhythm : « sprinters »

Gail DEVERS usa

19	Age	32	
<u>1986</u>		1999	Progr
1.02	Interval	0.95	
0.32 0.70	Flight Run	0.31 0.64	15% 85%

TOP SPEED FOR 100M HURDLERS

Progression of interval rhythm : « sprinters »

Gail DEVERS usa 19 Age 32 1986 1999 **Progr** 1.02 Interval 0.95 Flight 0.32 0.31 15% 0.70 0.64 Run **85%**



Lolo JONES usa

18	Age	26	
<u>2001</u>		2008	Progr
1.03	Interval	0.95	
0.34 0.69	Flight Run	0.28 0.67	75% 25%



TOP SPEED FOR 100M HURDLERS

Progression of hurdling efficiency from junior to senior :



Relevance of the classical « technicians vs sprinters » categories ?

TOP SPEED FOR 100M HURDLERS

Implications for training



TOP SPEED FOR 100M HURDLERS

Implications for training

Limits to training devoted to develop:

STRENGTHS ? WEAKNESSES ?



TOP SPEED FOR 100M HURDLERS

Implications for training

Limits to training devoted to develop

STRENGTHS : physiologic tolerance **WEAKNESSES :** psychologic tolerance



TOP SPEED FOR 100M HURDLERS

Kinematic parameters changes for the flying 20m test – Gnima FAYE sen

Date	20m fly time	SL m	SF hz	CT s	FT s
2013 March 16	2.43	2.00	4.1	0,118	0,125
2013 March 29	2.40	2.07	4.0		
2013 April 13	2.27	2.10	4.2		
2013 June 03	2.23	2.08	4.3		
2013 July 21	2.21	2.06	4.4	0,107	0,119



TOP SPEED FOR 100M HURDLERS



Kinematic parameters changes for the fastest interval (from 13.42 to 13.10) ▲

▼ 100m hurdles, top 8 all-time best results – Gnima FAYE sen

13.10	0.1 3h2	Paris	13 Jul 2013
13.11	1.1 4	Paris	13 Jul 2013
13.15	1.2 4	La Chaux-de-Fonds	7 Jul 2013
13.17	1.3 6	Angers	16 Jun 2012
13.18	0.1 2h1	La Chaux-de-Fonds	7 Jul 2013
13.22	1.91	Lausanne	4 Jul 2013
13.29	0.3 3	Nottwil	30 Jun 2013
13.33	1.8 4h1	Montgeron	13 May 2012

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TOP SPEED FOR 100M HURDLERS



TOP SPEED FOR 100M HURDLERS

Yordanka DONKOVA's clearance rhythm improvements during 1988 season



Times for 4th Hurdle

	Take-Off (s)	Flight (s)	<u>Touch-Down (s</u>)	100m H
25 Apr 88	0.112	0.303	0.109	12.47
20 Aug 88	0.083	0.293	0.083	12.21 wr

▶ « On some changes in the technique of the WR holder Yordanka DONKOVA » G. Dimitrov (1989)

TOP SPEED FOR 100M HURDLERS

Clearance rhythm for hurdlers of different level of performance



Times for 4th Hurdle

		Take-Off (s)	Flight (s)	Touch-Down (s)	100m H
Y. DONKOVA bul	20 Aug 88	0.083	0.293	0.083	12.21 wr
S. PEARSON aus	03 Sep 11	0.096	0.289	0.074	12.28
T. PORTER gbr	17 Aug 13	0.119	0.284	0.091	12.55
A. DECAUX fra	13 Jul 13	0.108	0.317	0.085	12.70
G. FAYE sen	13 Jul 13	0.124	0.277	0.097	13.10
Regional (n=14)	23 May 15	0.142	0.374	0.118	15.51

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Videos

Examples of variety of patterns at both regional and elite level

Practical Workshop

Examples of workouts devoted to specific SF & SL for high hurdles