

# JUSTIN GATLIN WR 9.77 - RACE ANALYSIS

## Short Report

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Justin Gatlin (USA) put Qatar in the spotlight by equalling the 100m world record of 9.77s at the IAAF Super Grand Prix in Doha. This short report will provide a detailed analysis of his race and attempts to determine the key elements that lead to matching the world record time.

The 100m final was filmed using two digital video cameras (frame rates 50 Hz and 60 Hz, respectively) where each camera panned (moved with the athletes) over the entire race. The cameras were placed and operated from stands ~20m above the track level at ~55 and 85m from the starting line. The original track marks were used to identify the split times every ten meters. The video was synchronized using the start gun flash and the zero mark was set to the video frame immediately prior to start gun's visible flame/smoke. The 10m split times were calculated from the video image and this was used to determine the average running speeds. Results have been presented in the table below.

	10m	20m	30m	40m	50m	60m	70m	80m	90m	100m
<b>Total time [s]</b>	1.93	2.98	3.89	4.74	5.58	6.39	7.21	8.07	8.91	9.77
<b>Split time [s]</b>	1.93	1.05	0.91	0.85	0.84	0.81	0.82	0.86	0.84	0.86
<b>Speed [<math>\text{m s}^{-1}</math>]</b>	5.18	9.52	10.99	11.76	11.90	12.35	12.20	11.63	11.90	11.63

The results showed that Gatlin was able to achieve a maximal speed of  $12.35 \text{ m}\cdot\text{s}^{-1}$ . The highest speed recorded prior to this mark was set by Carl Lewis and Ben Johnson at the Seoul Olympics in 1988 ( $12.1 \text{ m}\cdot\text{s}^{-1}$ ) [1]. Incredibly, Gatlin was able to improve upon this 'record' during two consecutive splits (50-70m). Gatlin was also able to compensate for a relatively slow start (3.89s at 30m) by completing the race with a higher relative speed ( $11.60\text{-}11.90 \text{ m}\cdot\text{s}^{-1}$ ). In comparison, Maurice Greene had 3.81s at the 30m mark in Athens 1997, when his 100m time was 9.80 s [2].

Gatlin also exhibited a unique stride pattern that utilized long strides in conjunction with a relatively low stride frequency. The average values for the race were 2.40 m and 4.26 Hz for stride length and frequency, respectively. The previously reported values from the World Championships and Olympic Games showed a range of 2.15-2.35 m for stride length and 4.4-4.8 Hz for stride frequency [2].

Although in no way should Gatlin be discredited by his performance, it must be mentioned that weather conditions were ideal to match the world record performance (wind +1.7, temperature  $33^{\circ}\text{C}$ ). Neither should the excellent performance of Olusoji Fasuba (NGR), who in all probability assisted Gatlin with the world record by adding the competitive component to the feat. Fasuba was actually leading up to 75m mark and finished the race with a new African record of 9.84 s. With such impressive performances so early in the season, one can only expect this to be an outstanding sprint season.

### References

- [1] Brüggemann G-P & Glad P (eds) (1990). IAAF Scientific Research Project at the Games of the XXXIV Olympiad - Seoul 1988. Final Report.  
[2] Brüggemann G-P et al. (eds) (1999). Biomechanical Research Project Athens 1997. Final Report.



# Aspire

Academy for Sports Excellence

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## Qatar IAAF World Super Tour

### 100m Final WORLD RECORD

Wind Velocity: 1.7 [m/sec]

Qatar Sports Club Stadium

8:00 PM

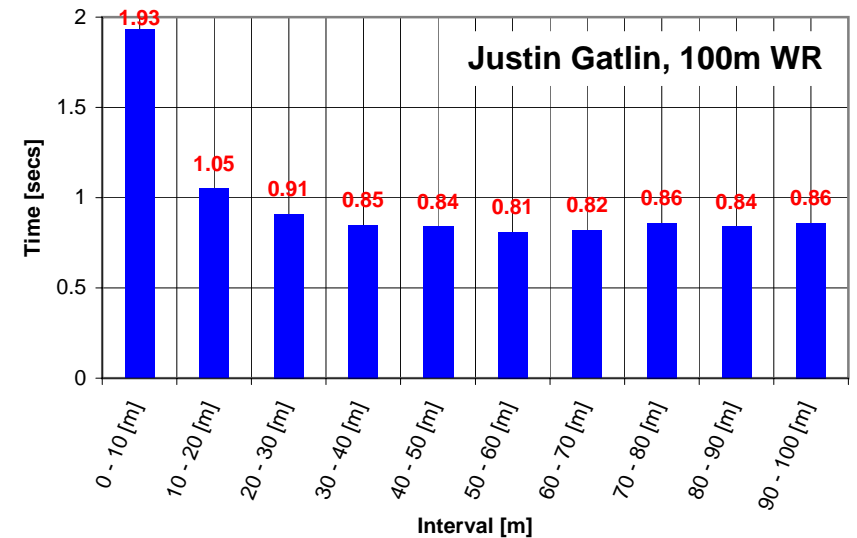
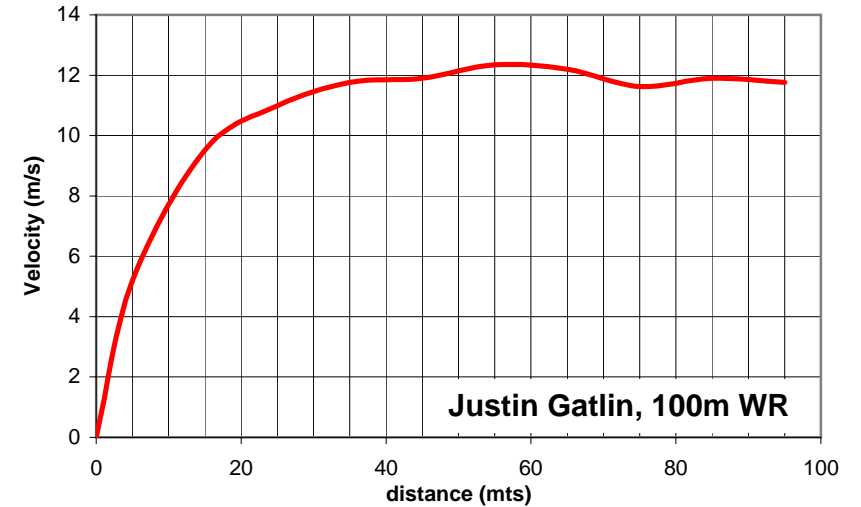
### Kinematic Analysis

### Brief Report

Place	Name	Country	Birth Date	Height [m]	Weight [Kg]
1	Justin Gatlin	USA	10-Feb-82	1.854	81.64

Distance [m]	Time [sec]	av. Velocity [m/sec]	10 m interval [sec]
10	1.93	5.18	1.93
20	2.98	9.52	1.05
30	3.89	10.99	0.91
40	4.74	11.76	0.85
50	5.58	11.90	0.84
60	6.39	<b>12.35</b>	0.81
70	7.21	12.20	0.82
80	8.07	11.63	0.86
90	8.91	11.90	0.84
100	9.77	11.63	0.86

Average Stride Length [m]: **2.40**  
 Average Stride Frequency [steps/sec]: **4.26**



Interval times taken with 50 [Hz] and 60 [Hz] cameras from a point of view 20 [m] height, 55[m] and 85[m] from the starting line

Performance Enhancement Section - Sports Department