EFFECT OF RELAY CHANGEOVER POSITION ON SKATING SPEED FOR ELITE SHORT TRACK SPEED SKATERS

Conor Osborough and Sarah Henderson

School of Science and Technology, Nottingham Trent University, Nottingham, UK

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INTRODUCTION: Relay changeovers in short track speed skating take place when the incoming skater pushes the outgoing skater at the start of the straight. Time can be gained or lost during these changeovers, depending on how effectively they are executed. The position on the track where initial contact between skaters is made is thought to be a critical factor in an effective relay changeover (Riewald et al., 1997). The aim of this study was to determine how the position of the relay changeover on the track would affect skating speed (SS).

METHODS: Eight elite male short track speed skaters (21.8 $\pm$ 2.4 yrs), who were members of the British Short Track Speed Skating Team, consented to participate in this study. Participants completed six relay trials during two separate testing sessions, under simulated race conditions. For each relay, participants were instructed to initiate their changeover in one of three positional zones: Early; Middle; Late (i.e. a distance of 3.5 m, 4.0 m or 4.5 m from the start of the straight respectively). On the second date, the trials were counterbalanced. Trials were recorded, at 50 Hz, from the stands using three digital video camcorders. Forty-nine relay changeovers were selected for analysis. SS was determined from the positional change of each skater's hip joint centre, which was digitised from the video-footage over the length of the straight. For each positional condition, the SS of each changeover was plotted and the equation of the trendline found. Using this, the SS of the second and sixteenth changeover was determined. Changes in mean SS of the changeover straight were analysed for the three positional conditions (1 x 3 ANOVA). The level of statistical significance was set at $p < 0.05$.

RESULTS: There was a change in skating speed between the second and the sixteenth changeover, for each of the three positional conditions (Early: 11.01 $m \cdot s^{-1}$ vs. 11.20 $m \cdot s^{-1}$; Middle: 11.18 $m \cdot s^{-1}$ vs. 11.14 $m \cdot s^{-1}$; Late: 11.21 $m \cdot s^{-1}$ vs. 10.86 $m \cdot s^{-1}$). Mean changeover straight SS (11.23 $\pm$ 0.67$m \cdot s^{-1}$) using the middle condition was non-significantly higher, when compared to the other two conditions (Early: 11.06 $\pm$ 0.25 $m \cdot s^{-1}$; Late: 11.09 $\pm$ 0.30 $m \cdot s^{-1}$).

DISCUSSION: Although there were non significant findings, there was some evidence to suggest that initiating the relay changeover in the middle zone produced the fastest SS during the changeover straight, when compared to the Early or Late zones. Furthermore, SS appeared to be most consistent between the start and end of the relay when the changeovers were initiated in the middle zone.

CONCLUSION: The results from this study suggest that small performance gains (in the region of 1% to 1.5%) might be found if short track relay changeovers are consistently initiated between 3.5 m and 4.0 m from the start of the straight. Such improvement gains are of value in an event where a team's success is usually decided by fractions of a second.

REFERENCES:

Riewald, S., Broker, J., Smith, S. & Otter, J. (1997). Energetics and timing of relay exchanges in short track speed skating. *Medicine and Science in Sports and Exercise, 29*(5), 45.

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