Acceleration and Velocity in Speed Skating

Possible transfers to Ice Hockey
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1. Speed Skating - Theory

- **Acceleration**: is the change in velocity over time (m/s²)
- **Velocity**: rate of change of position (m/s)
- **Work**: product of force and distance moved (Nm)
- **Power**: rate at which work is performed (Nm/s or watts)
1. Speed Skating - Theory

- Start from a standing position
- Only forward direction and left turns
- Air resistance
- Ice friction:
  - Blade:
    • stiffness, length, width, rocker, sharpening
  - Ice:
    • water quality, temperature
2. Speed Skating - Practice

• Work =

\[ \text{Force} \times \text{Distance} \]
2. Speed Skating - Practice

- Power = work / time
2. Speed Skating - Practice
Start and Acceleration
2. Speed Skating - Practice

Measure velocity at specific distance to gain insight in acceleration

Data source IAT
2. Speed Skating - Practice

Measure velocity at specific distance to gain insight in acceleration

Acceleration 30 m Ladies

(Data source IAT)
2. Speed Skating - Practice
2. Speed Skating - Practice

QuickTime™ and a Motion JPEG OpenDML decompressor are needed to see this picture.
2. Speed Skating - Practice

initial push off

2nd push off

7 May 2010
Marion Wohlrab
Diplom Coach
2. Speed Skating - Practice

landing

3rd push off

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Diplom Coach
2. Speed Skating - Practice

4th push off

Marion Wohlrab
Diplom Coach
2. Speed Skating - Practice

Important:

• Regroup under center of gravity to gain new momentum and accelerate center of mass
• 100% power per push off during acceleration
• Knee and hip drive
• Power Skating Position SIT
  – SIT - strength in transition (4-way hip and core stability)
  – SIT - small angle in knee and ankle
• Extension velocity x distance
3. Training
Main Muscle groups

- **Core** (stability at Start, involvement of arms)
- **Adductors** (regrouping under center of gravity)
- **Abductors** (stability while lifting leg off ice)
- **Hip flexors** (knee drive, regrouping)
- **Gluts** (push off, hip drive)
3. Training
Exercises for Strength

Youth/Adult Speed
• Olympic lifts
  • (strength)
• Squats - one legged
  • (strength & balance)
• Resistance runs on/off ice
  • (strength & hip drive)
• Distance/Power oriented skating
  • (power per push off)
• Dryland
  • (strength)

Youth/Adult Hockey
• Olympic lifts
  • (strength)
• Squats - one legged + hockey stick + visual cues
  • (strength & balance & skill & body awareness)
• Resistance runs on/off ice
  • (strength & hip drive)
• Power oriented skating
  • (power per push off)
• Dryland w/wo stick
  • (strength)
3. Training
Exercises for Strength

**Kids Speed**
- Olympic lifts
  - (technique & stability)
- Squats - one legged
  - (strength & balance)
- Resistance runs
  - (on/off ice) (strength&hip drive)
- Dryland/Imitation
  - (technique & strength)

**Kids Hockey**
- Olympic lifts
  - (technique & stability)
- Squats - one legged
  - (strength & balance)
- Resistance runs
  - (on/off ice) (strength&hip drive)
- Dryland/Imitation
  - (technique & strength)
3. Training
Exercises for Speed/Power

Youth/Adult Speed

• Over speed runs (on/off ice)
  • (nervous system & leg speed)

• Frequency oriented skating
  • (leg speed)

• Plyometrics SIT
  • (power)

Youth/Adult Hockey

• Over speed runs (on/off ice)
  • (nervous system & leg speed)

• Frequency oriented skating w/ change of direction
  • (leg speed)

• Plyometrics w/ upper body involvement, w/ spin
  • (power & balance & orientation)
3. Training
Exercises for Speed/Power

Kids Speed

- Frequency oriented skating
  - (leg speed)

- Plyometrics SIT
  - (power)

- Relay push offs
  - (technique & nervous system & strength)

Kids Hockey

- Frequency oriented skating w/ change of direction
  - (leg speed, orientation)

- Plyometrics w/ upper body involvement
  - (power)

- Relay push offs
  - (technique & nervous system & strength & balance)
3. Training
Exercises for Technique/Agility

**Youth/Adult Speed**

- Slide board
  - (direction of push & regrouping)
- Dryland (mirror)
  - (instant feedback)
- Inline Treadmill (mirror)
  - (instant feedback)
- Video

**Youth/Adult Hockey**

- Slide board w. stick handling, obstacles
  - (direction of push & regrouping & agility)
- Dryland w/ stick
  - (instant feedback)
- Inline Treadmill
  - (instant feedback)
- Video w/wo pressure situations
3. Training
Exercises for Technique/Agility

Kids Speed

• Slide board
  • (direction of push & regrouping & strength)

• Imitation
  • (movement)

• Video

Kids Hockey

• Slide board w/ stick handling
  • (direction of push & regrouping & strength)

• Imitation/slow motion
  • (movement)

• Video
4. Possible transfers to Ice Hockey

• Power Skating Position (PSP)
  – SIT - Strength In Transition (4-way hip and core stability)
  – small angle in knee and ankle (think of unlacing top eyelet)
  – get down on your push
4. Possible transfers to Ice Hockey

• Gaining momentum by adding mass to center of gravity
  – Regroup
  – Drive knee under center of mass

• 100% bouts
  – Do it or leave it!
Go fast -
be first at the puck -
score the goal!

Thank you!

INTERNATIONAL ICE HOCKEY FEDERATION

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