Power Development Solutions

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Overview:

- What is Power?
- Why do we need Power?
- Where do we use Power?
- When do we use Power?
- How do we develop Power?
As horizontal velocity increases...our ability to apply force decreases!
What is Power?

- The amount of force that can be generated over the shortest amount of time.
- Rate of force development or how quickly force is applied.
- Combination of strength & speed.
- The less time it takes to move the same weight (lbs) over the same distance allows for greater power exertion (F x V/Time).
Why do we need Power?

- Lifting HEAVY weights does NOT mean an athlete will be more explosive!
- Late in acceleration and throughout the transition phase only a percentage of strength gained in the weight room is utilized.
Maximal Strength

- The higher the maximal strength levels, the greater the percentage of max strength can be utilized for power exercises.

- It is necessary to have optimal strength to provide a quicker movement, but not so much that it cannot be used for or may hinder explosiveness.
Where do we use Power?

- Late in acceleration phase and early in transition phase:
  1. Must be able to use strength **PLUS** speed (aka: speed strength)
  2. Going too fast to use maximal strength.
  3. Off the ground in approx. .024 sec per step. Air time is basically equal for everyone but minimizing ground time is what is important. Elite athletes spend less time on the ground.
Elastic Strength

- Ability of a muscle to stretch and contract at a rapid rate.
- Ability to overcome resistance at a high rate of speed.

Depth Jumps:
### When do we use Power?

<table>
<thead>
<tr>
<th>Duration of Session Effort</th>
<th>Energy System(s)</th>
<th>Power/Capacity</th>
<th>Training Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 0.2 sec</td>
<td>Nervous</td>
<td>Power</td>
<td>Reaction</td>
</tr>
<tr>
<td>(per leg)</td>
<td>Alactic (stored muscular ATP)</td>
<td></td>
<td>Initial Thrust</td>
</tr>
<tr>
<td>0 to 0.1 sec</td>
<td>Alactic (Cp system)</td>
<td>Power</td>
<td>Single leg thrust at top speed</td>
</tr>
<tr>
<td>1 to 2.0 sec</td>
<td>Alactic (nervous + stored ATP + Cp)</td>
<td>Power</td>
<td>Starts</td>
</tr>
<tr>
<td>2 to 5.0 sec</td>
<td>Alactic (Cp system)</td>
<td>Power</td>
<td>Acceleration</td>
</tr>
<tr>
<td>5 to 15.0 sec</td>
<td>Alactic (Cp system)</td>
<td>Power</td>
<td>Maximum speed (Flying start)</td>
</tr>
<tr>
<td>15 to 30.0 sec</td>
<td>Alactic (extended Cp system)</td>
<td>Capacity</td>
<td>Speed endurance (ability to hold &gt;95%)</td>
</tr>
</tbody>
</table>
When do we use Power?

1. Block Clearance
2. Acceleration
3. Transition
4. Maximum Velocity
5. Maintenance

GOAL: Become EXPLOSIVE OVER TIME!!
Main Power Exercises to Develop Sprint Components

**SHORT JUMPS**

- Variance of single takeoffs with one or both legs
- Variance of three and five jumps out of a standing position

**LONG JUMPS**

- Series of jumps with one leg and changing legs, bounding over 30m, 60m, and 90m and more.
### Difference Between Short & Long

<table>
<thead>
<tr>
<th>Maximal and intensive takeoff with short jumps.</th>
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</thead>
<tbody>
<tr>
<td>Adjustment to maximal speed of movement in the repetitions of the long jumps.</td>
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</tbody>
</table>
Short Jumps

Single & short jumps influence development of acceleration, stride length & stride frequency

Standing LJ

Alt. Step Ups
Long Jumps

Increase maximal speed & speed endurance

Maximal Speed Correlation: 30M ACC + 60M Bounds

Speed Bounds
Connection of short and long jump exercises in training offers the greatest training effect and a simultaneous development of specific power abilities in sprinting.
Contrast Training

- A series of loaded and unloaded (heavy & light) exercises.
- Heavy or “loaded” exercises prepare the body for maximal muscular and nervous system effort.
- When unloaded the muscular & nervous systems react with more explosiveness.
- Sets are generally done with 2 reps loaded followed by 1 set unloaded = 2 on/1 off
Power development should only be executed when the body is not fatigued because the nervous system is heavily involved.
Recommendations

Most jump exercises should be executed during the first half of the preparation period, at the end of the preparation period & taper during the season.

High intensity, low volume short jumps and bounding exercises should be executed during the early and middle main competition phase.
Recommendations

Jump training should begin with low quantity of long jump exercises, gradually changing to a big quantity of short jumps, intensive jump training & long jumps.
Recommendations

When short & long jumps are carried out in one session, do short jumps first.
Recommendations

Short jumps & speed jumps should be done **before** sprint training.

Long jumps should be done **after** sprint training.
Recommendations

After sessions with great a quantity of jumps the next training session should stress speed endurance with repetition runs over longer distances.
Plyometric Limiting Factors

As force increases, *velocity* decreases so as jump loads are increased speed is compromised.

- Run–Run–Bound is a great exercise to increase velocity while optimizing power levels.
- Speed Bounds are also a very effective way of maximizing, both, stride length & stride frequency.
Jump Circuit

- Hurdle Hops
- Standing Long Jump
- Alternating Step Ups
- Depth Jumps
- Altitude “Freeze” Jumps
- 3 Bounds
- 5 Bounds
- 10 Bounds
Suggested Training

0 – 30 Meters
- Blocks
- Short Jumps
- Depth Jumps
- Standing LJ
- ACC Stick Drill
- Power Clean
- Snatch
- Quick Paw

Altitude “Freeze” Jumps
**Suggested Training**

**30 - 60 Meters**

<table>
<thead>
<tr>
<th>Short Jumps</th>
<th>Assistance</th>
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<tbody>
<tr>
<td>Ins &amp; Outs</td>
<td>Resistance</td>
</tr>
<tr>
<td>Flying 30's</td>
<td>Downhill</td>
</tr>
<tr>
<td>Contrast Training</td>
<td>Stride Frequency (Top end speed)</td>
</tr>
<tr>
<td>Speed Bounds</td>
<td>Inertia Runs</td>
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<tr>
<td>Forced Stretching</td>
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<tr>
<td>Suggested Training</td>
<td>60 - 100 Meters</td>
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<tr>
<td>-------------------</td>
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<tr>
<td>Stride Length</td>
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<td>Maintenance</td>
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<tr>
<td>Long Bounds</td>
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<tr>
<td>Intramuscular</td>
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<tr>
<td>Technique</td>
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<tr>
<td>Hip Flexor</td>
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<tr>
<td>Hip Extensor</td>
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<tr>
<td>Low Step Ups</td>
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