3D Static Strength Prediction Program (3DSSPP)
Why use 3DSSPP?

• To analyze a single lift, push or pull
• To estimate strength requirements
• To estimate back compression forces
• To evaluate reach or posture requirements
• To evaluate worker balance
• To evaluate floor traction requirements
What does the program require?

• Manipulation of a body segment
• Knowledge of the load lifted, push, pulled, etc.
• Can place a picture in the background to mimic a posture for a particular job.
Individual Case

- 63 year old woman
- Previous history of back pain and has degenerative disc disease in the lumbar spine with spondylolisthesis
- Injury: Lifting a large pot from a stove to a walk in cooler (to the floor)
  - Weight: 36 lbs (~16.4 kg)
  - Distance of 18 feet (~7 m)
Shoulder Pain

• 55 year old man
• Shoulder strain
• Lifting 51 lbs overhead for majority of day
Prevention

- Can be used to assess lifting tasks and the effect on the back or other body segments

<table>
<thead>
<tr>
<th>Assumed Posture</th>
<th>80-lbs</th>
<th>60-lbs</th>
<th>40-lbs</th>
<th>80-lbs</th>
<th>60-lbs</th>
<th>40-lbs</th>
<th>80-lbs</th>
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<th>40-lbs</th>
<th>80-lbs</th>
<th>60-lbs</th>
<th>40-lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight Lifted</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>% Capable</td>
<td>8%</td>
<td>43%</td>
<td>85%</td>
<td>13%</td>
<td>58%</td>
<td>90%</td>
<td>21%</td>
<td>61%</td>
<td>91%</td>
<td>11%</td>
<td>48%</td>
<td>87%</td>
</tr>
</tbody>
</table>

Occupational Health Clinics for Ontario Workers Inc. 
Centres de santé des travailleurs (ses) de l’Ontario Inc.
Positive Aspects

- Risk of back injury quantified from a single number (compression or moment)
- Strength requirements at all major body joints estimated
- TLVs based on measured human tissue tolerance
- Versatile in type of tasks analyse (i.e. lifting, lowering, pushing, pulling):
  - Consider effects of
    - Direction and magnitude of the external force
    - Asymmetrical postures
    - Worker can be partially supported (e.g. Leaning on table – Note: you need to measure this force)
    - Specific to weight, height, sex of worker or to a specific population percentile
    - Accounts for twist and lateral bending
    - Predicts values which can be compared to NIOSH standards
Limitations

• Static assumption is used, therefore dynamic movement is not considered.
• Single acute not repetitive lifts. Fatigue not accounted for in this approach.
• TLVs for disc compression same for men and women.
• Can only be used on static positions
• Disc failure is the major component in establishing TLV
• Tissue load tolerance data sparse