Die cast and assembly operation, 100 unionized employees, initiated formal program in 1995, study conducted in 2006. Improvements included two major capital improvements, but mostly systematic application of “standard” ergonomic improvements.
An employee reported shoulder pain from manually agitating parts in a dip tank, and as a result, a mechanical device was fabricated. Unexpectedly, the number of rejects dropped dramatically. It retrospect, the manual task was too fatiguing to do properly.

Plant size: 150 employees.

Before-and-after reductions:
- Peak load on lower back — 43%
- Average load on back — 60%
- Time-Weighted Load — 66%
- Time savings — 15%
Before-and-after reductions:

**Back**
- Peak: 74%
- Average: 23%
- Time-Weighted: 58%
- Time: 15%

**Shoulder**
- Peak: 13%
- Average: +21%
- Time-Weighted: 33%

Results whole plant
- Before: 125 units/hour
- After: 250 units/hour
Comparison of lift method and layout

Lift 3 (worst) to Lift 1 (best) comparison:
Back
- Peak: 38%
- TWL: 43%
- Time: 40%
Shoulder
- Peak: 32%
- TWL: 50%

Operate Small Press, work cycle analysis

Wasted time is 93% of cycle, due to reaching
Time and Physical Demands Analysis (TAPDA)

Method
- Videotape the task
- Review the video, pausing at regular intervals, e.g. each 0.5 second
- Calculate the physical demands for each frame, e.g. biomechanical model.
- Graph the results
- Summarize statistical results

Advantages
- It shows the physical demands for each step of a job, enabling analysts to identify more clearly the specific portion of a task where problems lie.
- It includes time, which most other methods do not, enabling decision makers to better understand how physically demanding tasks often reduce efficiency.
- The method incorporates most of the key variables of concern in a single graph:
  - Posture
  - Force
  - Motions (each motion is separately observable on the graph)
  - Magnitude of the load on the body
  - Duration of the load on the body
- Using biomechanics as the foundation of the method makes the results more scientifically accurate than other common scoring systems and bypasses questions on how to combine effects of different risk factors.
- The results are intuitive, i.e., the load on the back and shoulder measured in pounds/foot pounds (or kilograms/newton-meters) rather than a number on a scale that few people are familiar with.
- The graphs are easily understandable by managers and decision-makers, providing a good format around which to base reports and presentations.

Best Uses
- Comparison of time and physical demands
  - before-and-after changes
  - within a single task
  - between similar tasks or methods
- Relate MSD risk factors to non-value-added activities

Future
- Perhaps with further development this method provides a universal task quantification system useful for epidemiology, i.e., measurement of the “dose” to compare with injury rates.
  - Add factors for static load, vibration, etc.
  - Develop wrist model
“5000 Ergonomics Solutions”
On-Line Knowledgebase

Background

The website is funded by NIOSH Small Business Innovation Research Grant (SBIRG) as a commercial product and is hosted by www.ergoweb.com.

Phase I — Complete with 1000+ solutions for Material Handling and Workstations
Phase II — 4000 more solutions planned for Handtools, Maintenance, Warehousing, Machine Operation, and more

Completed

Tutorials
How to design a workstation
Ways to improve material handling
Setting up a production line

Material Handling Categories

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<tr>
<th>Pallet and container lifts</th>
<th>Conveyors</th>
<th>Slides</th>
<th>Conveyor gates</th>
<th>Carts</th>
<th>Lifter-Transporter</th>
<th>Wheels</th>
<th>Air casters</th>
<th>Tuggers/pushers</th>
<th>Large containers</th>
<th>Hand held totes</th>
<th>Tilters</th>
<th>Dumpers</th>
<th>Pallets</th>
<th>Hoists</th>
<th>Manipulator arms</th>
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Workstation Design Categories

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<thead>
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<th>Fixtures: bench top</th>
<th>Fixtures: free-standing</th>
<th>Height adjustment</th>
<th>Visual Access</th>
<th>Lighting</th>
<th>Magnification</th>
<th>Parts handling</th>
<th>Storage</th>
<th>Surface dimensions</th>
<th>Surface material</th>
<th>Slanted surface</th>
<th>Standing platforms</th>
<th>Arm supports</th>
<th>Clearance</th>
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<th>Seating</th>
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<th>Footrests</th>
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Each category provides a range of options from low-cost to high-end solutions, each illustrated with photos from actual workplaces. Many show good ideas that were fabricated in house. Links to vendors of commercial products are provided. Each category includes background on problems, the ergonomics principles affected, and the underlying design objectives. Cautions about common pitfalls are included.