



Ergo Tip of the Month - January 2007

Quantifying Physical Demands Continued: Rating of Perceived Exertion

As was discussed in December's Ergo Tip of the Month, the methodology known as Psychophysics is a practical approach to assessing the capabilities of performing work through human perception. Another psychophysical assessment used to conduct ergonomic analyses is the Borg Rating of Perceived Exertion (RPE) Scale. Psychophysical measures based on Borg's Rating of Perceived Exertion (Borg, 1982) have been shown to be consistent, reproducible, rapid, inexpensive and convenient methods to assess physical working capacity.

Practical Applications:

There are many situations in industry where it is difficult to measure the forces required to complete a task. For example, in the auto industry when installing electrical wire harnesses, forces can be applied in various directions simultaneously. This makes it difficult to use a force gauge. The Borg RPE Scale allows the operator and observer to subjectively rate the level of effort required. Other industries that use the Borg RPE scale include Sports Fitness/Training, Rehabilitation and other Healthcare Fields.

Using the Borg Scale:

The Borg CR10 Scale measures the Rating of Perceived Exertion by having an operator or observer rate the effort required to complete a task on a scale of 0 to 10. A rating of "0" requires no effort whereas a rating of "10" is considered the "Almost Maximum". The scale is used by first finding the "Verbal Anchor" (from the chart below) which best fits the experience and then using the corresponding number scale to provide a rating. The perceived levels of exertion can be determined for the whole body or a specific region.

The following is the Borg CR10 Scale, including the numerical rating and verbal anchor:

Rating	Verbal Anchor
0	Nothing at all
0.5	Extremely weak (Just noticeable)
1	Very weak
2	Weak (light)
3	Moderate
4	
5	Strong (heavy)
6	
7	Very strong
8	
9	
10	Extremely strong
*	Absolute maximum



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Other subjective assessment methods for evaluating physical demands include:

- Strain Index – The Strain Index is a tool used to assess the risk of work-related musculoskeletal disorders of the distal upper extremities (hand, wrist, elbow)
- ACGIH Hand TLV – The ACGIH TLV for Hand Activity Level is intended for “mono-task” jobs performed for four or more hours per day. It specifically considers the average Hand Activity Level (HAL) and peak hand forces.

References:

Borg, G. (1998). *Borg's perceived exertion and pain scales*. Stockholm: Human Kinetics.

J. Steven Moore and Arun Garg, The Strain Index: A proposed method to analyze jobs for risk of distal upper extremity disorders; *Am.Ind. Hyg. Assoc. J.* 56:443-458, 1995.

American Conference of Governmental Industrial Hygienists (ACGIH) (1999). Proposed Threshold Limit Value for Hand Activity. Cincinnati, OH

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