# Appendix E Homework #5 Ergonomics

Purpose of Assignment Learn how to apply NIOSH lifting equation and the anthropometry charts, which are given in the Chapter 16 of the Course Notes. Also, the assignment emphasizes after one has made calculations, they then need to make recommendations based on the calculated results and explain (sell) their recommendations. As noted in C’Notes p.1-2, “also, some of the homework assignments are not as obvious as the academic “calculate x” and may require more thought, judgment and assumptions than you are used to in prior courses as they are more like industrial assignments.”

Show your calculations

1. Your boss/client has asked you to make a lifting assessment of the following job. A worker unloads trays of powder metal parts from a sintering oven and puts them on a hand cart. The trays with parts weigh 10 to 20 pounds (so simplify and assume all weigh 20 pounds) and they emerge from the oven every 30 seconds. This job is done for an 8-hour shift, with nominal breaks and the workers currently perform no other tasks. Assume the workers twist and as in most tasks they twist an equal amount to each side.



**16 inches**

**14 inches**

1A: Does the task exceed the 1994 NIOSH guidelines? Fill in the worksheet on page F-2 using formulae and guides given in Chapter 16. [30 pts]

1B: Advise your boss/client how can the task be improved. Make at least 2 significant suggestions (10pts) and quantify the benefits (in terms of the NIOSH guidelines) of your suggestions (10pts.). Consider the physical realities when making the suggestions; don’t just pick values to produce a numeric result.

1. Your plant is starting a new operation and you have been asked to recommend the working heights of the workstations. There are 3 tasks: the hand operated brake press, checking the part after bending, and assembling it with other parts. The operators stand to operate the press and are seated for the other two jobs. Assume the 3 tasks have different ergonomic difficulties, the press is “heavy work”and match the other tasks with an appropriate difficulty (“precision” “light work”). The plant would like to assign these three tasks to women and men.

2A: Recommend the heights of the work surfaces for the 3 tasks for the 5th percentile woman. [18 pts]

2B: Recommend the heights of the work surfaces for the 3 tasks for the 95th percentile man. [18 pts]

2C: Advise your employer/client, can these tasks be assigned to both women and men? [7 pts]

2D. Explain your recommendations (that is, sell them to your employer/client). [7 pts]

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**Job Analysis Worksheet**

**Job Description**

**Department** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Job** **Title** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Analyst’s** **Name**

**Date** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 1. Measure and record task variables**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Object  Weight (lbs) | | Hand Locations | | | | Vertical Distance | Asym. Angle | | Freq. Rates | Duration | Object Coupling |
| Origin | | Dest. | | Origin | Dest. | lifts/min | Hrs |
| L (Avg) | L (Max) | H | V | H | V | D | A | B | F |  | C |
|  |  |  |  |  |  |  |  |  |  |  |  |

**Step 2. Determine the multipliers and compute the RWL’s**

RWL = 51 \* HM \* VM \* DM \* AM \* CM \* FM

**Origin** RWL = 51 \* \* \* \* \* \* = lbs

**Destination** RWL = 51 \* \* \* \* \* \* = lbs

**Step 3. Compute the LIFTING INDEX**

**Origin** Lifting Index = Object Weight (L) / RWL = / = \*

**Destination** Lifting Index = Object Weight (L) / RWL = / = \*