

Manual Material Handling Assignment

20% of final course mark

KIN 4161 Occupational Biomechanics
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Completion Details

Introduction

The purpose of this assignment is to:

- Provide you with experience analyzing industrial related lifting tasks.
- Interpreting the results from the Psychophysical lifting tables and the NIOSH lifting equation to make appropriate workplace recommendations.
- Assess screening tools to calculate spine loads.

There are 3 sections to this assignment:

- Section 1: Lifting Task
- Section 2: Pushing Task
- Section 3: Stacking Tires

Instructions

Section 1: Lifting Task

1. You have just watched the video entitled “Lifting and Pushing Task”.
 - **IMPORTANT:** Please note that the work pattern in the video consists of the employee pushing the trolley of boxes (this will be analyzed in section 2) and then stacking the boxes on the pallet. The video shows the task of unloading two boxes from the trolley when in actual fact the trolley would have 10 boxes on it. The lifting task lasts 2 minutes and then the employee gets the next trolley, which takes approximately 3 minutes. Therefore, there is 2 minutes of lifting followed by 3 minutes to acquire the next trolley of boxes. The lifting is done at a rate of 5 lifts/min and this entire tasks is done for approximately 3 hours of a day.

Measurements that are necessary for the completion of this assessment are provided in the following table.

Box Dimensions	44 cm wide x 42 cm high	mass = 12 kg
Crate Dimensions	33 cm wide x 27 cm high	mass = 12 kg
Box Lift		
Horizontal distance from ankles to hands (H)	Origin = 35 cm	Destination = 61 cm
Vertical distance from floor to hands (V)	Origin = 95 cm	Destination = 161 cm
Crate Lift		
Horizontal distance from ankles to hands (H)	Origin = 25 cm	Destination = 45 cm
Vertical distance from floor to hands (V)	Origin = 85 cm	Destination = 161 cm

2. Determine the MAWL (Snook or Mital) for the lifting task using the Psychophysical MMH assessment sheet provided.
3. Conduct a NIOSH assessment of this task to determine the RWL and the lifting index. Show all your work. Use the KIN4161_NIOSH Job Analysis Worksheet provided.
4. Answer the following questions:
 - Is the task considered safe by the Psychophysical and NIOSH standards? If these tools rendered different recommendations, what was the reason for this?
 - What are the major concerns in this task as identified in your analysis?
 - What are your recommendations for improvement? How will these recommendations improve the results obtained from your assessment? [Think about the elements in each of the assessment tools].
 - What would be your assessment of low back pain risk? Provide support for your answer.
 - What is the static net spine load on the back based on the motion capture data? Consider the worst position in the lifting task to make your estimation. Clearly identify the assumptions that you have made in estimating the net spine load.

Section 2: Pulling/Pushing Task

1. You have just watched the video entitled “Lifting and Pushing Task”. In this section, the assessment is related to the pushing the trolley with 10 boxes on it. The employee retrieves the trolley of boxes from the storage area and then pushes the trolley 450 cm, to the where they will unload the boxes onto the pallet. The height of the cart is 92 cm and it is 153 long. The initial force required to move the trolley 40 kg and the sustained force required to push the trolley is 35 kg.
 - **IMPORTANT: Please note that the rate of pulling/pushing is one every two minutes, for three hours.**
2. Assess the pulling and pushing task using the assessment tool you deem the most appropriate.
3. Answer the following questions:
 - a. Why did you choose that assessment tool? Provide a brief justification.
 - b. What are your recommendations for the task based on your results?

Section 3: Stacking Tires

1. You have just watched the videos entitled “tire stacking front” and “tire stacking side” which covers a task where a worker must stack tires from a pallet onto the wall brackets.
 - **IMPORTANT:** Please note that this task is done at a rate of 6 lifts/minute. The task is done for a one-hour period daily. The following diagram provides dimensions and weight of the tires being stacked as well as the height and mass of the worker.

Subject:

Height: 165 cm

Mass: 69.5 Kg

Tire:

Width: 22 cm

Diameter: 60 cm

Mass: 18 Kg



2. Assess the task using the assessment tool you deem the most appropriate.
3. Answer the following questions:
 - a. What is your estimation of the low back reaction load [force and moment] based on the external load (the tires) and the body posture? Show your work.
 - b. What is the net shear and compression load on the spine? Show your work.
 - c. Briefly discuss the result of your assessment and back load calculation in terms of recommendation(s) for improvement of this work task, if necessary.

Formatting for Deliverables

IMPORTANT: This assignment has 4 deliverables.

Deliverable 1: Section 1 Worksheet

- Provide the completed KIN4161_Snook Worksheet and KIN4161_NIOSH Job Analysis Worksheet for *Section 1: Lifting Task*
- Save as a PDF document called:
 - KIN4161_MM Assignment_Section 1 Worksheet.pdf

Deliverable 2: Section 2 Worksheet

- Provide the chosen assessment worksheet for *Section 2: Pulling/Pushing Task*
- Save as a PDF document called:
 - KIN4161_MM Assignment_Section 2 Worksheet.pdf

Deliverable 3: Section 3 Worksheet

- Provide the chosen assessment worksheet for *Section 3: Stacking Tires*
- Save as a PDF document called:

- KIN4161_MMH Assignment_Section 3 Worksheet.pdf

Deliverable 4: PDF File Containing Answers to Questions

Use the following format for this deliverable:

- Cover page
- Use each section name as a heading
 - Provide answers to the relevant questions under each section heading
- Arial 12-point font
- Single space
- APA referencing style should be used throughout, including a References page
- Write assignment in Word
- Save as a PDF document called:
 - KIN4161_Assignment 3_Answers.pdf

Grading

Please refer to the rubric linked in the *Manual Material Handling Assignment* screen in D2L for details about the specific expectations for this assignment.