Example of Completed Analysis Tables 1 and 2

Background

A meat processing plant recently developed an Ergo-Team to deal with some in-house issues. This plant employs 400 employees, on two shifts, 5 days per week. One shift is from 6:30am to 3pm, with a 30minute lunch included, and the second shift works from 3:30pm to 12am, with a 30 minute lunch included. 200 employees work on each shift, and the shifts rotate every 2 weeks, so that no employee has to remain on evening shift for extended periods.

Primary cutting and processing of the meat occurs only during the day shift, creating a backlog of material for the evening shift. Sorting and packaging tasks occur across both shifts. On the evening shift, the employees who normally do primary cutting and processing tasks on day shift are split up to work in other departments.

In the sorting department, where small pieces of meat are sorted into pans, there are a number of worker's compensation claims related to low back injury. A body map survey was distributed to the workers in this department and nearly all respondents reported experiencing fatigue and discomfort in the lower back at the end of their workday.

The Ergo-Team conducted an interview with 2 employee volunteers and a common theme in the interviews was that the workers felt more strain on their back during the day shift compared to the evening shift. The workers thought this may be because evening shift work does not have any shipping work, so more employees are available to help with work on the sorting line, reducing their work load. These volunteers were then observed during work and video recorded for task and activity analysis (table 1a and 1b). The job involves only one task/operation – filling the pans with pieces of meat. Within that task/operation there are two sub-operations: 1) reaching to take a piece of meat from the conveyer, 2) turning to drop the meat into the pan on the left.

This information was used to create links to reports of back pain, to analyze determinants and propose preliminary solutions. The results are summarized in Table 2 below.

EXAMPLE Table 1a: Description of operations, postures, and efforts (risk factors)

Subject I.D.: 001 **Workstation:** Sorting department

Operation/Task: Filling pans with meat

Sub-operation: Reaching to take pieces of meat from conveyer belt

CIRCLE* the postures/movements in each plane for each joint. Make note whether it is a posture S *(static)* or movement D *(dynamic).

Flex. = Flexion
Ext. = Extension
L-Bend = left lateral bend
R-Bend = right lateral bend
R. Twist = right twist
L. Twist = left twist
Adduc = adduction
Abduc. = abduction
Med. Twist = medial twist
Lat. Twist = lateral twist
Pron. = pronation
Supin. = supination
U.Dev. = Ulnar Deviation
R.Dev = Radial Deviation
N= Neutral
S. elev. = scapular elevation

Comment on the force/ load (light/ heavy), pulling/pushing, repetition, frequency, duration, holding/ carrying involved. Other information, comments, and observations: Are tools used? Are there specific questions you would like to ask? Are there operations that happen sporadically and not a part of their routine or work cycle?

Joint	Front/Back			S / D	Exertion	Side to Side			S / D	Exertion	Rotation			S/D	Exertion
Trunk	N	Flex.	Ext.			N	L.Bend	R.Bend			N	R. Twist	L Twist		
Neck	N	Flex.	Ext.			N	L.Bend	R.Bend			N	R. Twist	L Twist		
R. Shoulder/ Upper Arm	N	Flex.	Ext.			N	Adduc.	Abduc.			N	Med Twist	Lat Twist		
L. Shoulder/ Upper Arm	N	Flex.	Ext.			N	Adduc.	Abduc.	D		N	Med Twist	Lat Twist		
R. Elbow	N	Flex.	Ext.												
L. Elbow	N	Flex.	Ext.												
R. Forearm											N	Pron.	Supin.		
L. Forearm											N	Pron.	Supin.		
R. Wrist	N	Flex.	Ext.			N	U.Dev.	R.Dev.							
L. Wrist	N	Flex.	Ext.			N	U.Dev.	R.Dev.							

L.Palm/Fingers	Pulp Pinch	Lat. Pinch	Palm Pinch	Finger Press	Press	Grasp	N
R.Palm/Fingers	Pulp Pinch	Lat. Pinch	Palm Pinch	Finger Press	Press	Grasp	N

Comments: Each piece is very light and requires very minimal flexion of the shoulder/arm. The trunk is flexed during this activity. While attaining material, the trunk is in

a constant state of flexion in a relatively static posture.

EXAMPLE Table 1b: Description of operations, postures and efforts (risk factors)

Subject I.D.: 001 **Workstation:** Sorting department

Operation/Task: Filling pans with meat

Sub-operation: Turning to drop the pieces into a pan at the left

CIRCLE* the postures/movements in each plane for each joint. Make note whether it is a posture S *(static)* or movement D *(dynamic).

Flex. = Flexion
Ext. = Extension
L-Bend = left lateral bend
R-Bend = right lateral bend
R. Twist = right twist
L. Twist = left twist
Adduc = adduction
Abduc. = abduction
Med. Twist = medial twist
Lat. Twist = lateral twist
Pron. = pronation
Supin. = supination
U.Dev. = Ulnar Deviation
R.Dev = Radial Deviation
N= Neutral
S. elev. = scapular elevation

Comment on the force/ load (light/ heavy), pulling/pushing, repetition, frequency, duration, holding/ carrying involved. Other information, comments, and observations: Are tools used? Are there specific questions you would like to ask? Are there operations that happen sporadically and not a part of their routine or work cycle?

Joint	Front/Back			S / D	Exertion	Side to Side			S / D	Exertion	Rotation			S/D	Exertion
Trunk	N	Flex.	Ext.			N	L.Bend	R.Bend			N	R. Twist	L Twist		
Neck	N	Flex.	Ext.			N	L.Bend	R.Bend			N	R. Twist	L Twist		
R. Shoulder/ Upper Arm	N	Flex.	Ext.			N	Adduc.	Abduc.			N	Med Twist	Lat Twist		
L. Shoulder/ Upper Arm	N	Flex.	Ext.			N	Adduc.	Abduc.	D		N	Med Twist	Lat Twist		
R. Elbow	N	Flex.	Ext.												
L. Elbow	N	Flex.	Ext.												
R. Forearm											N	Pron.	Supin.		
L. Forearm											N	Pron.	Supin.		
R. Wrist	N	Flex.	Ext.			N	U.Dev.	R.Dev.							
L. Wrist	N	Flex.	Ext.			N	U.Dev.	R.Dev.							

L.Palm/Fingers	Pulp Pinch	Lat. Pinch	Palm Pinch	Finger Press	Press	Grasp	N
R.Palm/Fingers	Pulp Pinch	Lat. Pinch	Palm Pinch	Finger Press	Press	Grasp	N
Comments: Each piece is very light and requires very little effort of the upper limb. The trunk extends toward neutral from flexion, then a quick rotation and bends to the left to facilitate dropping the material inside the pan. The movements in this task are more dynamic; the speed of the twisting and bending of the trunk could create risk of injury.							

EXAMPLE Table 2: Problems, determinants, and possible changes			
Keep in mind - Why is the job done this way? What is wrong with doing the job this way? What changes might fix this problem?			
Problem/Issue	**What are the associated operations/sub-operations?**	**What makes this activity a problem?**	**Possible changes to eliminate the problem(s)**
Back pain	1) Reaching to take pieces of meat from the conveyer belt	i) The height of the conveyer is too low - Constant flexion of the trunk. ii) There are fewer workers available for the sorting department on day shift because more employees are needed for shipping tasks. This forces each worker to do more work to meet the same production standard as on the evng shift; therefore, more frequent and longer duration of trunk flexion. iii) Height of employees – taller employees will have to flex the trunk further to reach the conveyer.	i) Raise the height of the conveyer to allow a neutral standing posture. ii) Better distribute the workforce, ensuring number of workers available for sorting work is equal between day and evening shifts. iii) Introduce adjustable workstations. Set them to accommodate the tall employees and use adjustable platforms to allow shorter employees to set the appropriate height for themselves.
	2) Turning to drop the pieces into a pan at the left	i) The pan is 90 degrees to the left, forcing workers to turn to place material inside – result in frequent bending and twisting of the trunk. ii) Bending and twisting is always to the left loading same tissues. iii) Fewer workers for sorting department on day shift forces each worker to do more work to meet the same production standard therefore, more frequent and longer duration of trunk flexions.	i and ii) Create a place for the pan that is closer to the conveyer and immediately in front of the worker. Also, teach employees about back loading – pivoting the feet is healthier than rotating the spine. ii) Better distribute the workforce, ensuring number of workers available for sorting work is equal between day and evening shifts.
Do you have other questions? What about variability of the production - how would that change these activities and risks? What about the differences between the workers (different heights, for example)? How will you validate your information? How will you be able to make changes?			