# Assessment Report

**Submitted to:** Prof. J. Ripat
**Submitted by:** Michael Kuo
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# Assessment Report

## Purpose of Report and Identified Concern

As requested by your company, an assessment has been conducted on the workstations and working position for the individuals at the workstations. The identified concern was the potential back problems that can be caused by the poor design of the workstations and improper working position. This report is to provide recommendations on the modification of workstations and working position that might minimize the incidence of back problems of these workers that will be working in the Winnipeg plant.

## Assessment

I believe you are very familiar with what the workers are required to perform as the motors move along the assembly line, as well as the layout of the workstations. As the motor reaches the workstation via the conveyor belt, the employee lifts it off the conveyor belt, puts it on the work surface in front of him, completes a specific assembly task and then puts the motor back on the conveyor belt. Back (erector spinae, quadratus lumborum, and transversospinalis), neck and head (trapezius, splenius, erector spinae, transversospinalis, and levator scapulae) extensors are used to move the upper body from upright position to working position (see Appendix A) and back (Moore & Agur, 1995; Functional Kinesiology Notes, Dec 7/2000). When workers move from upright position to working position, *eccentric muscle action** occurs on the trunk, whereas *concentric muscle action* occurs when moving from the working position back to upright position. Neck and head muscles act *isometrically* throughout the whole task as it was observed that they don't move very much during the task

When the workers are in the working positions, an *isometric muscle action* occurs. The angle the trunk makes with vertical is approximately 20 degrees. The forward bending shifts the *center of mass* of the body forwards. This means that the back muscles need to create more force in order to compensate for the increase in *moment forces* created by gravity that act to pull the body forward. This awkward posture creates severe stress on the back, which might contribute to quicker muscular fatigue, causing stress on the spine, and joint pain on the lumbar vertebrae (Rice, 1998).

The distance that the workers need to reach for the motor is estimated about 60 centimeters, which is very close to the arm's length of an average person (see Appendix 1). This position generates a great deal of *moment forces* and pressure on the muscles, tendons, and joints (Phillips, Forrester, & brown, 1996; Rice, 1998). Increases in forces has a effect on the increased rate of muscular fatigue (Rice, 1998).

*Definitions of italicized words are in glossary

"This [muscular fatigue] is characterized by decreased capacity for exerting force" (Khalil, Abdel-Moty, Rosomoff, & Rosomoff, 1993, pp. 130) and presumably the muscles become more vulnerable to injuries.

I assume that every worker in the plant work 8 hours a day and each of them has two 15-minute breaks and a 30-minute meal break. So the duration between each break is about 2 hours. When working in a sustained period of time, especially in awkward postures, it appears that the incidence of disc problems is increased (Jayson, 1976). Repeated use of the same muscle groups, which this job demands, can also place increased strain on the muscles and tendons. This can cause the muscles to get sore faster and "prevent adequate tissue recovery from the effects of awkward postures and force" (Rice, 1998, pp. 162).

## Recommendations and Justification

### Worker

1. Stretch

Stretch and warm up muscles before working gets muscles and tendons ready for movement. When one is experiencing aches and pains on the back, stretch allows muscles to relax and therefore avoid the muscles become too fatigued (WCB, 1997).

2. Proper Body Mechanics

Tightening abdominal muscles before lifting has a supporting action on the spine. This tightening action "distributes weight evenly down the spine, allowing the strong leg muscles [which are designed to take heavy strain of lifting] to carry the weight" (pp. 27). Bending knees and maintaining a broad-based position also would help to prevent back injuries because in this position the weight of the motors can be shifted from front leg to the other, preventing unnecessary twisting of the back (CTS, 1994).

3. Decrease Duration of Job

This reduces the possibility of working in an awkward position for a prolonged period of time. More breaks for the employees should be to considered.

### Environment

1. Closer Conveyor Belt

Bringing the conveyor belt closer minimizes forward bending and the arms don' t have to be fully extended out, creating smaller moment arm. Therefore, the pressure and forces exerted on the muscles, tendons, and ligament on the back can be lessened and workers can maintain an upright position.

2. Adjustable counter

Because of the varied heights among the workers, adjustable counters should be considered to accommodate for these differences. As suggested by Webb (n.d.), a

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height of 85-90 cm is optimal for people with average height doing light assembly work. Employees can raise or lower the counter when needed. As the motors do not need to be lifted in this modified work station, the work could be considered light assembly.

A picture showing proper body mechanics and redesigned workstation is provided in Appendix B.

*Definitions of italicized words are in glossary

## References

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## Glossary

| | |
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| *Center of Mass* | The single point of the body about which every particle of its mass is equally distributed. For humans, the CM is slightly anterior tot he S2 Vertebrae. |
| *Concentric muscle action* | shortening of the muscle to aid movement. |
| *Eccentric muscle action* | lengthening of the muscle to slow movement. |
| *Isometric muscle action* | the muscle contracts and produces force without changing the angle of the joint. |
| *Moment Arm* | the perpendicular distance from line of force application to the axis of rotation |
| *Moment Force* | the product of the intensity of the force into the perpendicular distance from the point to the line of direction of the force |

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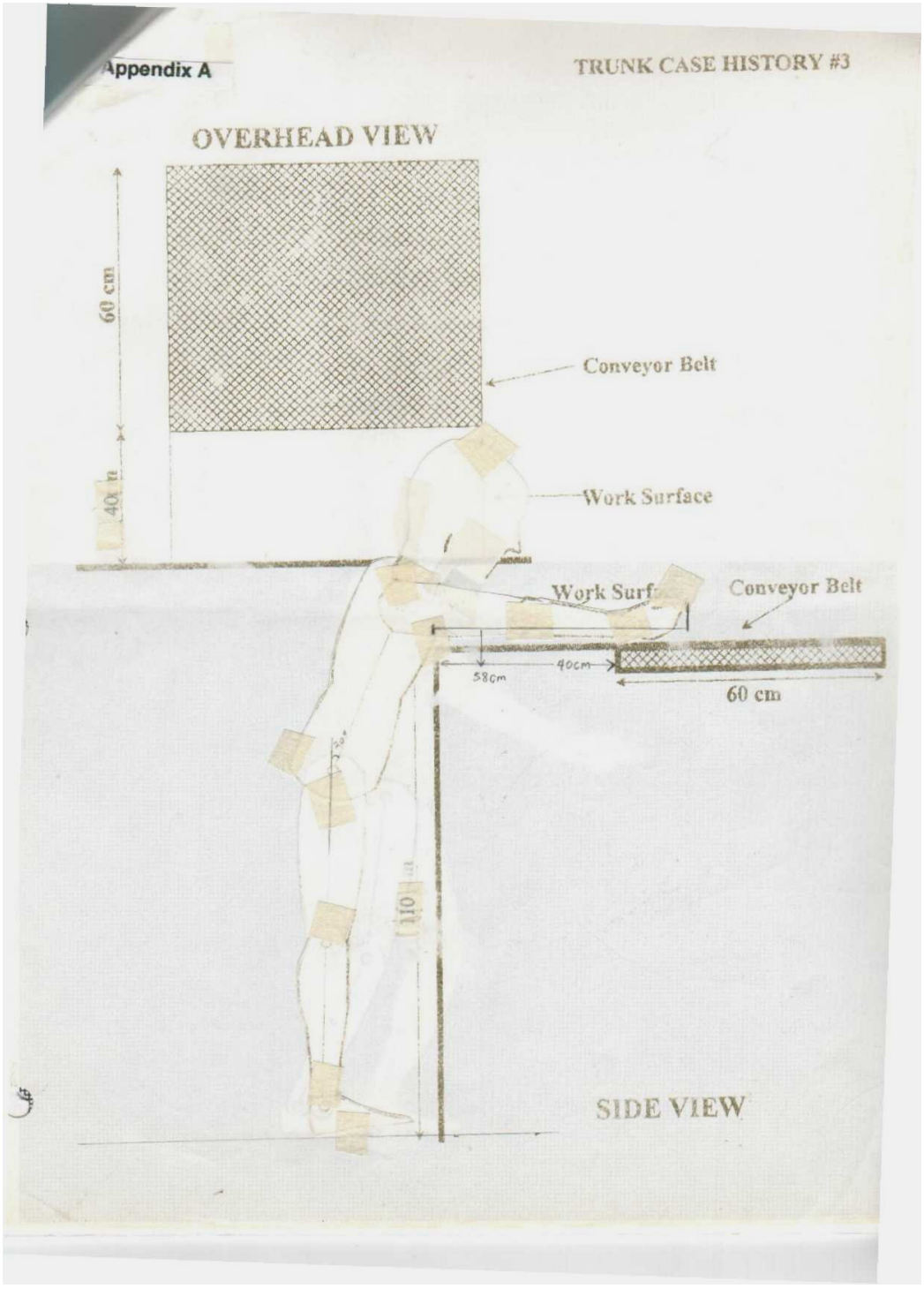


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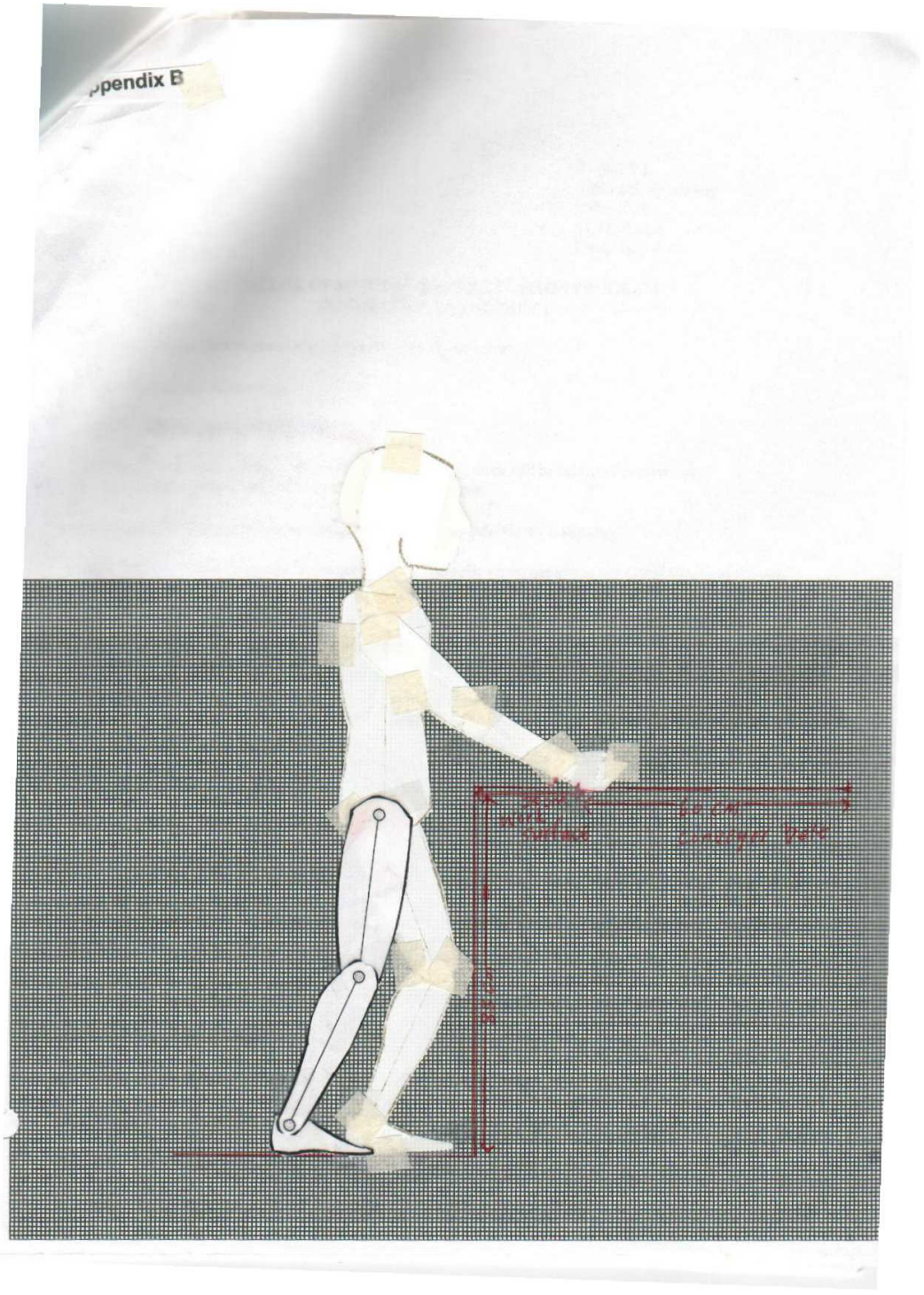


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