

CHAPTER 2. BODY MECHANICS AT WORK. RISK ASSESSMENT AND DESIGN

1. What is a 'good' posture? How would you decide?

One way to approach this is from first principles. If posture is the 'average orientation of the body over time' then we have to consider the loading patterns on the body as a consequence of adopting the posture while doing the task. Thus, a consideration of anatomical principles in relation to internal and external force generation is essential. If we take an ergonomic approach then a good working posture is process of adaptation to the task demands in the most resource efficient way. People may trade-off biomechanical demands for physiological cost savings, therefore the task may be mechanically demanding with low physiological load.

In practice, a good working posture is one which minimises the load on the body while carrying out the task, while ensuring that operators can exert the required forces and carry out task-related movements efficiently. From an ergonomic perspective, a good posture depends on an appropriate arrangement of the workspace and work objects to maximise efficiency.

2. Are biomechanical models for estimating spinal compression too simplistic?

Probably. The main drawback is that the effects of fatigue on the tissues themselves such that the threshold for injury is not the same at the end of the task as it was at the beginning. In this chapter, we have only reviewed

static models although dynamic modelling is possible with access to a force platform, accelerometers and so on. Best to see the models in Chapter 2 as 'first approximations' which are useful for estimating the benefits of workspace improvements for lowering spinal compression, rather than as absolute assessments of loading and therefore of risk. They are of obvious use when making cost-benefit arguments for ergonomic improvements to working conditions. This is because budget holders nearly always require evidence before they will approve additional allocations of funds.

3. Would it be possible to 're-engineer' the human body when designing lifelike robots?

Yes. If the intention was to build robots that were as lifelike as possible then it would be possible to re-engineer the human body, particularly, the skeleton. In humans the main areas of weakness are the lumbar and cervical spines and the knee and hip joints. These might all be re-engineered, either by making the components stronger or by developing alternative ways of achieving the function. A more general question concerns how lifelike the robots should be and why?