

How to Bring Ergonomics to the Factory Floor

Ergonomic planning in a production environment is dependent on how well the manufactured product's design allows for fast and error-free assembly, particularly as undetected errors could significantly impact product line results.

When products are designed for field installation, the larger system's fault diagnostics should be considered along with the ease of defective part removal and replacement and component tracking. If a product will be used by people, the product's ease of use must be addressed alongside consideration of user age, language, motor skills and more.

Assembly, Test & Repair

Generally part of the product design process, a trained ergonomist is responsible for assembly, testing and repair analysis. This should include planning for possible errors, with design features including:

- Accessibility of components
- Data recording components
- Decision-making requirements (i.e. pass/fail)
- Different types of fasteners
- Number and characteristics of tools
- Sophistication and diagnostic capabilities of test procedures
- Component weight, size, shape, temperature and edge sharpness
- Ease of component replacement or removal

Musculoskeletal Disorder Risk Factors

More than six different musculoskeletal risk factors must be considered

1. Forceful exertions and motions
2. Extreme or repetitive exertions, postures and motions
3. Duration of exertions, postures, motions, vibration and cold
4. Insufficient rest or pauses
5. Work factors (such as quotas or machine-paced tasks)
6. Environmental factors

One important consideration in workstation design is adjustable height requirements, as improper elevation can lead to extreme posture or motions in the workstation. It should be noted that working height and working surface height are almost always different, and the work surface height must therefore be determined in relation to the actual task performed.

Recommendation for an appropriate working height typically correlates to the elbow height of a particular user in relation to the following guidelines:

- Six inches above elbow height for fine work including small parts inspection
- Four inches above elbow height for precision applications like general assembly
- Elbow height for writing and light assembly tasks

- Four inches below elbow for packaging and other medium work

The height of the work surface depends on characteristics of the user as well as the object to be worked on, in addition to personal preferences, force required to perform the task, adjustability of the chair and footrest, and more. Height may be manipulated in several ways:

- Adjust the chair's height
- Adjust the work surface height by purchasing an adjustable height bench or by cutting off workbench legs or placing blocks beneath legs
- Adjust the height of other equipment such as microscopes and other devices
- Adjust the height of the work piece by using a fixture

Frequent Problems

Even "light duty" manufacturing applications are met with challenges including poor product design, awkward postures, fixed-height workstations, standing positions, poorly designed chairs, and inadequate maintenance. Many of these issues can be addressed with the following solutions:

1. Apply ergonomic principles to product design.
2. Conduct assembly error analysis to help anticipate where errors are most likely.
3. Analyze requirements for work surface size and shape, purchasing accordingly.
4. Determine adjustable workstation height requirements including the chair, footrest, work surface.
5. Carefully invest time and money in workstation chair selection.
6. Monitor employee work habits and train for best practices.
7. Consider job enhancements to encourage physical movement.