# Human Factors (Ergonomics)

**What is "Human Factors in Design"?**

Human Factors is the study of human interaction with a system. With respect to the system humans will:

- Occupy a workspace
  Device should "fit". Dimensions, envelope, etc. appropriate for target users.
  Refer to anthropomorphic data
  MIL-STD 1472D, MIL-HDBK 759A, DOT/FAA/CT-96/1
- Provide a source of power
  Required forces appropriate for target users.
- Act as a sensor
  Feedback through sound/feel
- Act as a controller
  Location, layout and size of controls, etc. appropriate for target users.

Reasons for applying/using Human Factors considerations in design:

- Safety
  Try to anticipate user errors in operation, for example
  Performing correct step on wrong item
  Performing step on correct item incorrectly
  Performing correct step at the wrong time
  Skipping a necessary step
- Quality
  Does the system should "work as it should", e.g. work as expected?
  This is a perception of the user based upon:
  Device is comfortable to use
  Device is easy to use
  Control logic is natural
  Operating condition easily sensed by user.

A system with a high rating in Human Factors considerations is usually regarded as "high quality" because it is perceived to work well by the user.

Remember: Cost < Price < Value

Strive for “User Friendly Design”

- Simplify operational tasks
  - Controls require a minimum number of steps
  - Learning effort is minimal
  - Product “looks” simple (minimum number of controls)
- Make controls and their functions obvious
  - Place control adjacent to device
- Make controls easy to use
  - Consider size and placement
  - For sequential operation, move left to right
  - Place the key and most frequently used controls adjacent to user
  - Avoid awkward motions
- Match human intention with action
  - Should only be one obvious correct thing to do
  - Use constraints (lockouts) to prevent incorrect actions
- Make displays large and easy to read
- Provide feedback
  - Light, sound, displayed information
- Standardize
  - May be de facto, examine industry (previous devices)