helps aviation maintenance supervisors learn about the points listed below that, if exercised, can enhance the work environment and productivity.

- Rewards and compensations for workers with good safety records.
- Motivation for workers to want to do well and work safely.
- Unifying work teams and groups so they get along and work together to get the job done right.
- Treating all workers equally.

Educational Psychology

Educational psychologists study how people learn and design the methods and materials used to educate people of all ages. Everyone learns differently and at a different pace. Supervisors should design blocks of instruction that relate to a wide variety of learning styles.

Industrial Engineering

Industrial engineering is the organized approach to the study of work. It is important for supervisors to set reasonable work standards that can be met and exceeded. Unrealistic work standards create unnecessary stressors that cause mistakes. It is also beneficial to have an efficient facility layout so that there is room to work. Clean and uncluttered environments enhance work performance. Another aspect of industrial engineering that helps in the understanding of human factors is the statistical analysis of work performance. Concrete data of work performance, whether good or bad, can show the contributing factors that may have been present when the work was done.

History of Human Factors

Around 1487, Leonardo da Vinci began research in the area of anthropometrics. The Vitruvian Man, one of his most famous drawings, can be described as one of the earliest sources presenting guidelines for anthropometry. *[Figure 14-7]* Around the same time, he also began to study the flight of birds. He grasped that humans are too heavy and not strong enough to fly using wings simply attached to the arms. Therefore, he sketched a device in which the aviator lies down on a plank and works two large, membranous wings using hand levers, foot pedals, and a system of pulleys. *[Figure 14-8]* Today, anthropometry plays a considerable role in the fields of computer design, design for access and maintainability, simplicity of instructions, and ergonomic issues.

In the early 1900s, industrial engineers Frank and Lillian Gilbreth were trying to reduce human error in medicine. *[Figures 14-9* and *14-10]* They developed the concept of

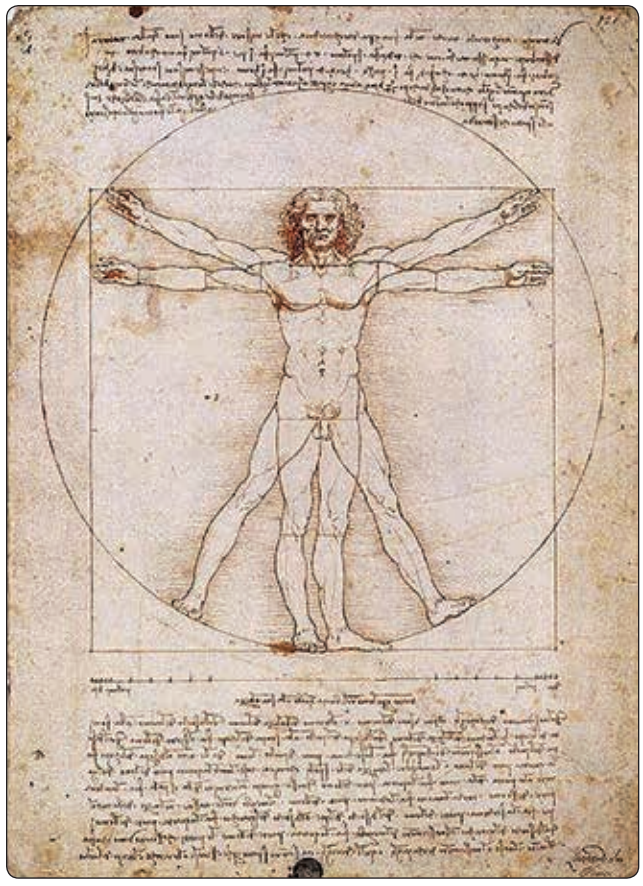

Figure 14-7. *Vitruvian Man, one of Leonardo da Vinci's most famous anthropometric drawings.*

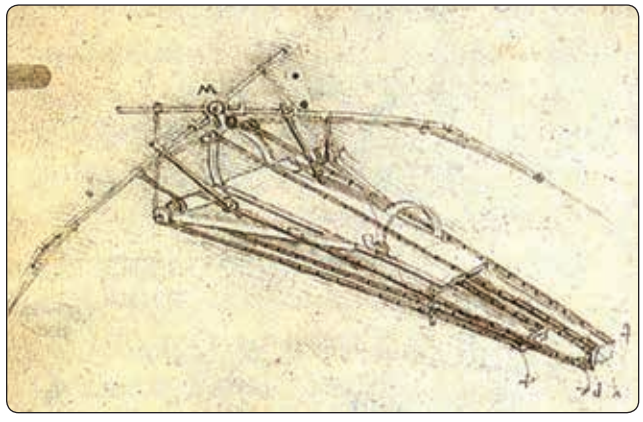

Figure 14-8. *Leonardo DiVinci's rendering of a flying device for man.*

using call backs when communicating in the operating room. For example, the doctor says "scalpel" and the nurse repeats "scalpel" and then hands it to the doctor. That is called the challenge-response system. Speaking out loud reinforces what tool is needed and provides the doctor with an opportunity to correct his/herself if it is not the necessary tool. This same verbal protocol is used in aviation today. Pilots