Helmet-Mounted Displays:
Sensation, Perception and Cognition Issues

Part One

Identifying the Challenges

The role of the Warfighter in the modern world has changed tremendously over the past two decades. While the primary job remains defeating the enemy, the Warfighter's role has been expanded to include peacekeeping, disaster relief, humanitarian aid, and anti-terrorism. To more effectively perform these tasks, the U.S. military is transforming itself into a more responsive and agile force that leverages advanced technologies. These advanced systems can expand the operational environment and multiply individual and unit capabilities. However, achieving optimal performance with these systems requires matching the engineering design characteristics of the system with the characteristics of the human user. Nowhere is this truer than for head- or helmet-mounted displays (HMDs), because such systems are intimately mated to the human senses of vision and audition. Failure to understand the human-machine interface can result in degraded performance, which for the Warfighter can mean the difference between mission success and failure or between a safe return and becoming a casualty. The issues of the human-machine interface encompass human anatomy and anthropometry, ergonomics, and human factors. Embedded in these issues is the important requirement to understand the roles of sensation, perception and cognition in the optimization of human performance with these advanced systems.