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Human Factors Evaluation of Laptops as a Technical Data Repository in Aircraft Maintenance

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HUMAN FACTORS: AN EVALUATION OF LAPTOPS AS A TECHNICAL DATA REPOSITORY IN AIRCRAFT MAINTENANCE

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Personal Backgrounds

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Overview

Human Factors

Occupational Ergonomics

Cognitive Ergonomics Psychology

Systems Theory

Literature Review

Findings

Human Factors

The Synthesis of Man and Machine

Torsion Physics Applied to the Human Body

ROM Considerations

Muscular Endurance / Fatigue / Eye Strain

Repetitive Motion Tasks

Biomechanical Orientation

Occupational Ergonomics

Keyboard Spacing / Layout

Key Size / Pressure-to-Input Ratio

Posture

Mouse Positioning

Pointing Device Location

Display Location

Cognitive Ergonomics Psychology

Defining Work Mentally & Physically

Objects / Tools

Pro Gear

Processes

Activities

Systems Theory

End User Task Capabilities

Value Stream Mapping

Process Dissection

Efficiency Modelling

Literature Review

Maneuvering
Lifting
Engaging
Positioning
Interacting
Human Geometry
Mouse vs. Touchpad vs. Nub vs. Touchscreen
Keyboard Styles
Monitor Types

Literature Review

Wrist & Hand Motion / Ulnar Deviation / Forearm Pronation

Spinal Alignment / Posture

Knee Positioning

Shoulder Abduction & Induction

Arm Extension

Chin Tilt Angle

Eye-to-Screen Alignment

Hip Angle

Findings & Contribution

Long Hours Result in Increased Musculoskeletal Risk

Split Keyboard Design is Most Effective

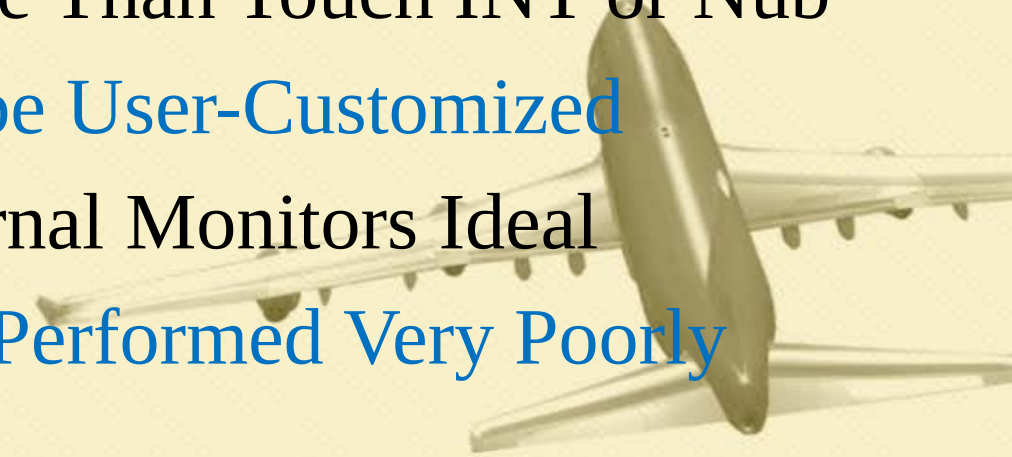
- SK Reduces Ulnar / Wrist / Forearm Motions

Mouse is More Sustainable Than Touch INT or Nub

- Arch and Buttons Must be User-Customized

Blue Light Omitting External Monitors Ideal

- Laptop Flip-Out Screen Performed Very Poorly



Findings & Contribution

Workstation Type

- Desk / Shelf / Table / Standing / Sitting

Seating Arrangement

- Knees Bent at 90 Degrees w/ Foot Stool

Body Geometry / Sitting vs. Standing

- Standing Overly Not Feasible D2 Constraints
- Vertical Data Entry Ideal For Biomechanics

Stretching & Periodic Movement is Healthiest

Findings & Contribution

Laptop Repetitive Motion Tasks

- Should be Avoided or Reduced if Possible

Compared to Traditional Books Laptops…

- Are Heavier & Increase Eye Strain
- Reduce Range of Motion / Motions Are Less Fluid
- Are Overwhelmingly Unnatural to Employ
- Are Cost-Effective & Easier to Update Than Paper
- Can Hold More Content / Quicker Data Access

Content Recap

Laptops Are Not Long-Term Cost-Effective

- Laptops Hold More Data / Are Simple to Update
- Keyboard & Mouse Spacing / Angle Are Important

Paper Books Are Easier on the Human Body

- Paper Books Are Difficult to Update
- Standing is Better Than Sitting
- Stretching is Critical to Injury Prevention

Feedback Session

Ideas

Input

Comments

Questions