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| **Workstation Case Study: *Workbench*** |

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| **ErgoSystems Workstation Design Worksheet** | | | |
| **Job/Task:** Assembly M3057 Unit | **Date:** 12-19-08 | **Time:** 1:00 PM | **Analyzed by:** Mark Anderson |
| **Area/Dept/Location:** 70445 | **Project Number:** 100345 | | **Employee Name:** Jane Smith |
| **Supervisor:** Marge Jones | **Workstation:** M3057 Unit | | **Job Title**: Equipment Builder |

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| **Define Design Question** |
| Define **Design Question** with necessary detail to accurately develop Design Specifications. |
| **standing workstation.jpgWorkbench**  Define the **Design Specifications** for a height adjustable workbench.  Specifications to include:   * ***Workbench height:*** Low/High adjustment range as measured from top of the worksurface to the floor. * ***Workbench dimensions:*** Worksurface depth, width and thickness. * ***Workbench foot/leg clearance****:* Specifications to allow for adequate foot/leg clearance under the worksurface. * ***Footrest platform:*** Size and location for footrest (if needed). * ***Method of height adjustment:*** Powered (type) or manual crank. * ***Storage bin location:*** Height and reach to bins (in needed). * ***Workbench weight capacity:*** Load capacity requirement for workbench. |

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| **Develop Design Criteria** | | |
| Develop the **Design Criteria** using theW5H Approach (*Who, What, When, Where, Why and How*). | | |
| **W5H** | **Questions** | **Outcome** |
| **Why**  Why will the workbench be used? | ***Validate rationale for workbench:***   * Is the workbench the best approach? * Modify process to eliminate need for the workbench? * Incorporate process at another location? * Use other type of workstation? (e.g. cart) | **Use of workbench validated:**   * Use of the workbench determined to be value added and integral to the process |
| **Who**  Who will work at the workbench? | ***Define user population:***       Description of the user population? (size, stature, age, experience, handedness, etc.) | **Diverse user population:**   * Small female to large male * Need to include 5th percentile female (5’0”) to 95th percentile male (6’2”) * Age range from 18 to 75 * Wide range of experience * 90% right handed, 10% left handed |
| **What**  What will be worked on at the workbench? | ***Define/describe parts, materials, tools, etc.:***       Size, shape, weight, quantity?       How staged or stored?       Influence appropriate workbench height? | **Parts:**   * Parts staged on the bench- Work in Progress (WIP) of 3 * Small parts stored in bins at workbench * Need to include 5th percentile female reach zone * Parts up to 35# in weight * Parts up to 5” in height * Parts handled from bottom of part * Parts up to 12” in depth * Parts up to 36” in length   **Tools:**   * Hand tools (screwdriver) * Counterbalanced overhead inline driver (air powered) |
| **How**  How will the workbench be used? | ***Describe how workbench will be used:***       Standing or seated worker position?       Describe job task (precision, light assembly, forceful assembly/manual handling).       Task will influence appropriate workbench height. | **Position:**   * Standing worker position   **Job Task:**   * Moderate forceful assembly with manual handling * Indicates work level/hand position at 2 to 6” below elbow level |
| **When**  When will the workbench be used? | ***Determine timeframe of use of workbench:***       Intermittent or continuous use?       Indication of exposure of user to the workbench | **Continuous use:**   * Three shifts * High workforce exposure to workbench |
| **Where**  Where will the workbench be used? | ***Determine location of workbench:***       Stand-alone bench or integrated into a line?       If integrated, how will it fit with other workbenches?       How will parts be conveyed from workbench to workbench?       Adequate access to workbench – ingress/egress? | **Stand alone workbench:**   * Small parts in bins at bench * Large parts conveyed to workbench via cart |

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| **Generate Design Specifications** | | |
| Generate the **Design Specifications** making use of the appropriate databases (ANSUR Database and\or other databases as indicated). | | |
| **Summarize Design Criteria** | | |
| ***Validation*** | Use of workbench is validated. | |
| ***Diverse user population*** | Population includes 5th percentile female to 95th percentile male. | |
| ***Parts*** | Parts weigh up to 35# and sizes up to 5” by 12” by 36”, small parts stored in bins at workbench. | |
| ***Tools*** | Hand tools and overhead counterbalanced inline driver. | |
| ***Work position*** | Standing work position. | |
| ***Job Task*** | Moderate forceful assembly with manual handling. (Indicates work level/hand position at 2” to 6” below elbow level)  Bin storage within reach of 5th percentile female | |
| **Determine required data point(s) and results** | | |
| ***Standing*** | **Elbow Height** *(5th%tile Female=37.6”, 95th%tile Male=47.1”)* | |
| ***Standing*** | **Forward Functional Reach- Acromial Process to Functional Pinch** *(5th%tile Female=22.0)* | |
| ***Standing*** | **Shoulder Height** *(5th%tile Female=46.5”, 95th%tile Male=61.4”)* | |
| ***Standing*** | **Eye Height** *(5th%tile Female=55.2”, 95th%tile Male=69.5”)* | |
| ***Footrest Location*** | **Location** - Height from floor with toe clearance (6” footrest height, 5” in from workbench edge) | |
| ***Knee Clearance*** | **Clearance** (5” from edge of workbench) | |
| **State Design Specifications** | | |
| ***Workbench height:*** Measured from top of the worksurface to the floor. Calculated by subtracting 4” from min/max values. | | **34” to 44”** (Low/High adjustment range) |
| ***Method of height adjustment:*** Powered (type) or manual crank. | | **Powered** (Electric-pneumatic height adjustment) |
| ***Storage bin location:*** Height and reach to bins. Note: attached to workbench and will move up/down in sync with bench. | | **10” to 20”** (Above workbench surface, allows reach to head level)  **22”** (Maximum reach to back of bin from front edge of workbench) |
| ***Workbench dimensions:*** Worksurface depth, width and thickness. | | **Depth:** 30”  **Width:** at least 48”  **Thickness:** max of 2” |
| ***Workbench foot/leg clearance****:* Specifications to allow for adequate foot/leg clearance under the worksurface. | | **5”** (From edge of workbench) |
| ***Footrest platform:*** Size and location for footrest (if needed). | | **4” to 6”** (Height from foot support surface and depth from front of any obstruction.) |
| ***Workbench weight capacity:*** Weight capacity based on parts, tools and table top weight (stainless steel). | | **500#** |

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| **Test Design Specifications** | |
| Test **Design Specifications** by applying to appropriate cases in the workplace. Modify design as indicated. | |
| Mock-up design as needed to allow testing.  Identify individuals who represent **Design Specification** boundaries.  Perform test and modify design as indicated. | Accomplished: workbench mocked up and tested. Design criteria were met. |

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| **Implement Design Specifications** | |
| Implement the **Design Specifications** and follow-up once in place. | |
| Implement the **Design Specifications**. | Accomplished: workbench in place and operational. |
| Follow-up to ensure adequate user acceptance. | On-going. |

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| C**omments** |
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