<table>
<thead>
<tr>
<th>ID number</th>
<th>Job title</th>
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<td>88</td>
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<td>Chip Truck Driver</td>
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<td>120</td>
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<tr>
<td>121</td>
<td>Strapper Loader</td>
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</tbody>
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Note: (P) indicates job included in pilot sample.
MOTIVATIONAL JOB DESIGN QUESTIONNAIRE

1. Autonomy: Responsibility, vertical loading; how much autonomy? That is, to what extent does the job allow (feed, independence, or discretion in) scheduling of sequence, work methods or procedures, or quality control? In different terms, how much control or responsibility for decisions concerning the work does this job allow? In short, is the job vertically loaded?

   1. The job allows almost complete autonomy in work sequencing, methods, etc., and Employee has almost complete responsibility for decision making concerning the work.
   2. The job allows some autonomy and responsibility for decision making, but some of the decisions are fixed or made by supervisors or others within the organization.
   3. The job allows very little autonomy and responsibility for decision making. Almost all decisions concerning scheduling, methods, procedures, etc., are fixed or made by others.

   Comments: 3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

2. Intrinsic job feedback: Does the job provide a high level of feedback? That is, to what extent does the job provide the individual with direct and clear information about the effectiveness (e.g., quality and quantity) of his or her performance? In different terms, to what extent does performing the job provide intrinsic feedback?

   1. The job itself provides a great amount of direct and clear feedback as to the effectiveness (e.g., quality and quantity) of the employee's performance. That is, feedback is available on a continuous or immediate basis and is specific to the employee.
   2. The job provides a moderate amount of performance feedback. That is, feedback is available on an intermittent basis, and/or is a function of the efforts of many employees.
   3. The job provides a limited amount of performance feedback. That is, it is rarely if ever available, and/or is completely contaminated by factors beyond the employee's control.

   Comments: 3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

3. Extraneous job feedback: Does the job provide feedback from other persons in the organization? That is, to what extent do supervisors, coworkers, etc., provide feedback or reinforcement for job performance (e.g., quality and quantity)?

   1. Other persons in the organization provide a great amount of direct and clear feedback as to the effectiveness (e.g., quality and quantity) of the employee's performance. This feedback is given on a regular or immediate basis, and is specific to the employee.
   2. Other persons in the organization provide a moderate amount of performance feedback. The feedback is given on an intermittent basis, and/or is a function of the efforts of many employees.
   3. Other persons in the organization provide a limited amount of performance feedback. Feedback is rarely if ever given, and/or is completely contaminated by factors beyond the employee's control.

   Comments: 3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)
4. Social Interaction: Does the job allow for positive social interactions? That is, to what extent does the job include team work, optional interactions, co-worker assistance, social support, etc.?

5. The job allows frequent opportunities for positive social interactions. This includes both interactions that are required by the job and interactions that are optional, as long as they are opportunities for positive social interaction (i.e., not likely to be conflict situations). A job could be rated high on this even though individual employees may not take advantage of these opportunities.

6. The job allows occasional opportunities for positive social interactions. This also includes jobs where there are many opportunities, but the opportunities are both positive and negative.

7. The job allows only infrequent opportunities for positive social interactions. This also includes jobs where there are many opportunities, but most of the interactions available are negative.

Comments:

3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

5. Task/Goal clarity: To what extent are the job's duties, requirements, instructions, performance levels, goals, etc., clear and specific? For example, a goal can be clear, but not specific (i.e., do the best you can vs. produce 5 units).

5. The job's tasks and goals are clear and specific almost all of the time. That is, either from the nature of the job itself or from instructions given by others, the exact tasks and performance goals are almost always clear and specific for the employee.

4. The job's tasks and goals are clear and specific most of the time. That is, sometimes the 'tasks' or goals are ambiguous or nonspecific.

3. The job's tasks and goals are clear and specific only a moderate amount of the time. That is, frequently the tasks or goals are ambiguous, non-specific, or nonexistent.

Comments:

3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

6. Task variety: horizontal loading: Does the job allow task variety? That is, to what extent does the job allow object variety (e.g., parts, tools, controls), motor variety (e.g., pace, location, operational), variety of different activities, etc.? In short, is the job horizontally loaded?

5. The job has a great amount of variety in tasks, activities, objects, motor movements, etc. That is, the specific nature of the job is frequently changed throughout the day, and/or changes significantly from day-to-day or from project-to-project.

4. The job has a moderate amount of task variety. That is, the tasks change only intermittently, and/or all the tasks are fairly similar in nature.

3. The job has only a limited amount of task variety. That is, the job consists of only a few distinct tasks, and/or all the tasks are very similar in nature.

Comments:

3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

7. Ability/Skill requirements and variety: Does the job require significant amounts and variety of knowledges, skills, and abilities (KSA's)? That is, to what extent does the job require a fairly high level of knowledges, skills, and abilities, does the job require a fairly high level of knowledges, skills, and abilities, and/or a variety of knowledges, skills, and abilities for task performance?

5. The job requires a great amount and variety of KSA's. That is, the job requires a high level of KSA's (e.g., training or experience of from a year to a few years) and requires a great variety of KSA's for successful performance.

4. The job requires a moderate amount and variety of KSA's. That is, the job requires a moderate level of KSA's (e.g., training or experience of from a few weeks to a few months) and a moderate amount of variety of KSA's if few of each kind are necessary.

3. The job requires a limited amount and variety of KSA's. That is, the job requires a low level of KSA's (e.g., training or experience of from a few hours to a few days) and a small amount of variety of KSA's if either hours or variety are high, give a 2 rating.

Comments:

3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

8. Task identity: Does the job provide task identity? That is, to what extent does an individual feel that he/she is producing a whole and identifiable piece of work, or an intermediate product, or a highly visible and complete transformation, or a natural unit or module of work, etc.?

5. The job provides a great amount of task identity. The job requires completion of whole and identifiable pieces of work that are attributable to the employee.

4. The job provides a moderate amount of task identity. That is, the job includes some activities that result in the completion of a whole piece of work, but other activities do not, or the whole pieces of work produced by the employee are the result of the efforts of a small group of employees; or the units produced are not highly complete and whole, but are close, etc.

3. The job provides a limited amount of task identity. The job requires the employee to produce a small part of the whole unit of work; the whole units produced are the combined result of many employees and processes.

Comments:

3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

9. Task significance: To what extent is the job significant and important compared with other jobs in the organization? That is, to what extent does the job have an impact on other people in the organization or, upon the organization goals?

5. The job has a great amount of significance and importance to other people in the organization or to the organization goals.

4. The job has a moderate amount of significance and importance to other people in the organization or to the organization goals.

3. The job has only a limited amount of significance and importance to other people in the organization or to the organization goals.

Comments:

3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)
10. Growth, learning, advancement responsibility: Does the job allow growth in terms of learning and increasing responsibility within the job itself? That is, to what extent does the job allow opportunities for learning and growth in competence on the job, for increasing responsibility and responsibility on the job, etc.?

5. The job allows a limited amount of opportunity for growth in terms of learning and increasing responsibility. That is, the job either requires or simply allows the employee to increase competence, proficiency, or responsibility, whether or not the employee does so.

3. The job allows a moderate amount of opportunity for growth in terms of learning and increasing responsibility. This includes situations where opportunities for advancement are possible, and situations where such an opportunity is available for growth.

1. The job allows a limited amount of opportunity for growth in terms of learning and increasing responsibility. In this job, little or no opportunity is available for growth.

Comments: 3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

11. Promotion: Does the job allow adequate opportunity for promotion? That is, to what extent are there opportunities for advancement to higher level jobs, and are the promotion practices fair and standardized?

5. The job allows a great amount of opportunity for promotion. That is, promotional opportunities are possible on this job, they occur at reasonable time intervals, and they are administered fairly (i.e., all employees are treated equally; criteria are job-related, standardized, and uniformly applied, etc.).

3. The job allows a moderate amount of opportunity for promotion. That is, promotional opportunities are possible but not frequent. If they are not always administered in a standardized and fair manner.

1. The job allows a limited amount of opportunity for promotion. That is, promotional opportunities are not possible or are very infrequent, and they are not always administered in a standardized and fair manner.

Comments: 3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

12. Achievement: To what extent does the job allow for feelings of achievement and task accomplishment?

5. The job allows a great amount of opportunity for feelings of achievement and task accomplishment. That is, there are many opportunities for employees to feel a sense of achievement and task accomplishment. These opportunities include regular feedback on performance and achievement.

3. The job allows a moderate amount of opportunity for feelings of achievement and task accomplishment. That is, there are opportunities for these feelings to exist on the job, but they are not frequent.

1. The job allows a limited amount of opportunity for feelings of achievement and task accomplishment. That is, there are few opportunities for these feelings to exist on the job.

Comments: 3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

13. Participation: Does the job allow participation in decision making? That is, to what extent does the employee allow others to participate in work-related decisions? Such as, does the employee allow others to participate in work-related decisions, in the work environment?

5. The job allows a great amount of participation in decision making. That is, the employee allows others to participate in work-related decisions, in the work environment.

3. The job allows a moderate amount of participation in decision making. That is, the employee allows others to participate in work-related decisions, but not all.

1. The job allows a limited amount of participation in decision making. That is, the employee allows others to participate in work-related decisions, but not at all.

Comments: 3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

14. Communication: To what extent do the incumbents in this job have access to all communication channels? This includes, the job allows access to all communication channels, and the job allows access to all communication channels.

5. The incumbents in this job have a great amount of access to all communication channels. That is, they receive all information relevant to their job, and they receive all information relevant to the job of others.

3. The incumbents in this job have a moderate amount of access to all communication channels. That is, they receive all information relevant to their job, and they receive all information relevant to the job of others.

1. The incumbents in this job have a limited amount of access to all communication channels. That is, they receive only the minimum necessary to perform their job, but little else.

Comments: 3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

15. Pay adequacy: To what extent is the pay adequate and equitable for the job? This includes, the pay is more than adequate compared to the job requirements, and the pay is adequate compared to the job requirements.

5. The pay is more than adequate considering the job requirements, and the pay is adequate considering the job requirements.

3. The pay is adequate considering the job requirements, and the pay is adequate considering the job requirements.

1. The pay is less than adequate considering the job requirements, and the pay is less than adequate considering the job requirements.

Comments: 3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)
MECHANISTIC JOB DESIGN QUESTIONNAIRE

1. Task fractionalization/specialization: To what extent is the job highly specialized in terms of function and/or activity? In other words, to what extent is the work performed in this department highly fractionalized such that each job represents only a very small piece of the total work performed?
   - 1. Highly relevant 2. Minimally relevant 3. Irrelevant (not rated)
   Comments:

2. Specialization of materials, tools, procedures: To what extent are the materials, tools, equipment, methods, etc., used in the job highly specialized in terms of function and/or purpose?
   - 5. Taken as a whole, the materials, tools, and procedures used on this job are extremely specialized. They are designed to have only one function or purpose.
   - 4. Taken as a whole, the materials, tools, and procedures used on this job are highly specialized. Many are designed for only one function or purpose.
   - 3. Taken as a whole, the materials, tools, and procedures used on this job are somewhat specialized. Most are designed for only one or a few functions or purposes.
   Comments:

3. Task simplification: To what extent are the tasks on this job simplified, and is the worker required to do only one thing at a time? In other words, to what extent are the tasks as uncomplicated as possible, and to what extent does the job require that the worker do many tasks or activities simultaneously or in very close succession?
   - 5. The tasks on this job are extremely simplified. The tasks are designed to be very uncomplicated, and the worker rarely has to perform multiple tasks simultaneously or in very close succession.
   - 4. The tasks on this job are moderately simplified. The tasks are designed to be uncomplicated, but the worker may have to perform multiple tasks simultaneously or in close succession.
   - 3. The tasks on this job are quite complex, and the worker frequently has to perform multiple tasks simultaneously or in close succession.
   Comments:

4. Job security: To what extent do the incumbents on this job have high job security? That is, how likely is the job to be eliminated or changed, and if so, how likely is the job to be eliminated or changed in the foreseeable future?
   - 5. This job has a great deal of job security. That is, neither the job, nor the incumbent's employment status, nor the conditions of employment are likely to change substantially in the foreseeable future.
   - 4. This job has a moderate amount of job security. That is, there is a chance that the job, the incumbent's employment status, or the conditions of employment could change in some manner in the foreseeable future.
   - 3. This job has a limited amount of job security. That is, it is very likely that the job, the incumbent's employment status, or the conditions of employment will change in the foreseeable future.
   Comments:
4. Skill Simplification: To what extent is the job designed in such a way that it requires very little skill and training time as possible? In other words, is what extent can nearly anyone perform the job with little practice?

5. The job requires very little skill and training time. Most anyone can perform the job with little practice. Training time is only from a few hours to a few days.

6. The job requires only moderate amounts of skill and training time. Training time for this job/skill takes from a year to a few years.

7. The job requires a great deal of skill and training time. Training time for this job/skill takes from a year to many years.

8. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

5. Repetition/Practic: To what extent does the job require repetition or practice? Examples include performing the same activity repeatedly or continuously, making identical items at the same time, machine or conveyor pacing of work, etc.

5. The job is almost completely repetitive and/or paced. The same activity is performed repeatedly and continuously; and/or the work is paced by machine, conveyor, or assembly line; etc.

6. The job is moderately repetitive and/or paced. The job frequently involves repeating the same activity, or making identical items at the same time, or is influenced by a machine cycle or pace, etc.

7. The job is repetitive or paced to only a very limited amount. Only occasionally are tasks repeated or many identical items made at the same time, and the work is not machine paced.

8. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

6. Idle Time/Capacity: To what extent is idle time and/or capacity minimized in the design of this job? In other words, is the time between tasks or activities minimized, and is the worker loaded to optimal capacity?

5. The job has only a limited amount of idle time and/or capacity. There is very little time between tasks or activities, and the worker is fully loaded most of the time.

6. The job has only a moderate amount of idle time and/or capacity. There is only a moderate time between tasks or activities, and the worker is adequately loaded most of the time.

7. The job has quite a bit of idle time and/or capacity. There is considerable time between tasks or activities, and the worker is not fully loaded most of the time.

8. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

7. Motion economy — materials handling: To what extent is this job surrounded by motion economy in terms of materials handling? In short words, to what extent is the physical movement of materials in the area of this job minimized and as efficient as possible? Interest here is in the actual movement of materials, rather than the physical movement of materials in the area of this job, or the movement of materials in general, or the efficient use of conveyors, etc.

5. The job is surrounded by a great deal of motion economy in terms of materials handling. The movement of materials is and from the work station is minimized and efficient.

6. The job is surrounded by only moderate amounts of motion economy in terms of materials handling. There are some occasions where efficient (e.g., high energy usage) movement techniques must be used.

7. The job is surrounded by very little motion economy in terms of materials handling. Much of the material is moved in inefficient ways, and many distances are not minimized.

8. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

8. Motion economy — prepositioning: To what extent are all tools, controls, and materials prepositioned and located so that the hands, the legs, the eyes, the head and materials are at or near the body’s center so that the least distance, the fewest activities are performed, and the movement of the body is minimized? For example, to what extent are all tools, controls, and materials located in fixed places close to the point of use?

5. Almost all materials, tools, and controls are prepositioned and arranged as to achieve maximum economy of motion and activity to accomplish the tasks.

6. Many of the materials, tools, and controls are prepositioned and arranged so as to achieve maximum economy of motion and activity to accomplish the tasks.

7. Only a few of the materials, tools, and controls are prepositioned and arranged so as to achieve maximum economy of motion and activity to accomplish the tasks.

8. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

9. Motion economy — eye and head movements: To what extent is the job designed to require little eye and head movement as possible?

5. The job requires only occasional eye and head movements to perform the primary tasks. Nearly all the work is performed at a single and stationary point in the visual field. Some eye movement, but almost no head movement is required for the primary tasks.

6. The job requires frequent eye and head movements to perform the primary tasks. Most of the work is in one location in the visual field, but peripheral activities are also necessary. Most of the movement is made with peripheral vision, but some head movement is also required.

7. The job requires almost continuous eye and head movements to perform the primary tasks. The work requires scanning of the entire visual field. Both eye and head movements are needed on a constant basis.

8. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)
10. Motion economy -- muscle movement: To what extent is the job designed to require the least muscle movement possible? For example, to what extent are most arm movements within central reaches, momentum is used frequently, few muscles are usually required, etc.? 

5. The job requires a limited amount of muscle movement. That is, most arm movements are within central reaches, momentum is used frequently, few muscles are usually required, etc.

3. The job requires a moderate amount of muscle movement. That is, occasional extreme reach movements are required, momentum is only occasionally used, a fair number of muscles are required. 

1. The job requires a great amount of muscle movement. Extreme arm movements are frequently necessary, momentum movements frequently have to work against momentum, a large number of muscles are required, etc.

Comments: Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

11. Motion economy -- muscle rhythm: To what extent is the job designed to allow an easy and natural working rhythm? In other words, to what extent is the work arranged to allow smooth, continuous motions and a free rhythm of muscle movements?

5. The job allows a great amount of free and natural working rhythm. That is, the workplace is arranged to allow a great amount of smooth, continuous, and rhythmic muscle movements.

3. The job allows a moderate amount of free and natural working rhythm. That is, the workplace is arranged to allow a moderate amount of smooth, continuous, and rhythmic muscle movements.

1. The job allows a limited amount of free and natural working rhythm. That is, the workplace is arranged to allow a limited amount of smooth, continuous, and rhythmic muscle movements.

Comments: Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

12. Motion economy -- muscle movement style: To what extent is the job designed to allow a favorable muscle movement style? For example, to what extent are movements made with both hands simultaneously in opposite or symmetrical directions; in curved, arched, or circular rather than straight lines, motions; in ballistic rather than highly controlled movements, etc.?

5. The job allows an extremely favorable muscle movement style. The workplace is designed so that many movements can be made with both hands simultaneously in opposite or symmetrical directions; in curved, arched, or circular rather than straight line motions; in ballistic rather than highly controlled movements, etc.

3. The job allows a somewhat favorable muscle movement style. Some simultaneous hand movements are allowed; some motions are curved and others are straight; both ballistic and highly controlled movements are required, etc.

1. The job requires an unfavorable muscle movement style. Many two-hand movements are not simultaneous and symmetrical; opposite hands, most movements are in a straight line, most movements are highly controlled, etc.

Comments: Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

13. Mechanization: To what extent is the job designed to be highly mechanized and automated? In other words, to what extent does machinery provide the power and control of the process? 

5. There is a great amount of mechanization in the design of this job.

3. There is a moderate amount of mechanization in the design of this job.

1. There is a limited amount of mechanization in the design of this job.

Comments: Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)
BIOLICAL JOB DESIGN QUESTIONNAIRE

1. Settng: What is the overall quality of the seating arrangements available on the job? In other words, does the job allow the worker to sit, stand, or work in an ergonomic posture? The job allows the worker to sit or stand or work with adequate posture and comfort.

2. Tool Desig: What is the overall quality of the design of the tools used on this job in terms of their biomechanical features? For example, is the grip appropriate in size, shape, and length to work with adequate control? Is the tool designed to reduce vibration? The tools are designed to reduce vibration and are easy to handle.

3. Anthropologie: To what extent is the job designed to allow for anthropometric differences between people? That is, do requirements for clearance, reach, and so on differ between men and women? The job does not take into account anthropometric differences.

4. Static effort: To what extent is the job designed to minimize static muscular efforts? In other words, does the job allow the worker to avoid injury and fatigue? The job minimizes static muscular efforts.

5. Endurance: To what extent is the required muscular endurance (e.g., dynamic effort) lost within reasonable limits? In other words, is the work continuous or intermittent? The work is continuous.

6. Strength: To what extent are the muscular strength requirements of the job not reasonable? That is, do any of the tasks require strength levels that may be beyond the capabilities of the worker? The tasks do not require unreasonable strength levels.

Comments:

Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)
7. **Lifting:** To what extent are the lifting requirements of the job reasonable?
In other words, less lifting is better than more lifting. The weights lifted should not be excessive (e.g., occasionally/frequently 40-50 lbs. for men, 20-30 lbs. for women). The weights should be placed appropriately (i.e., handled appropriately) and the lifting and carrying tasks should be designed to prevent back strain. Lower back strain occurs when the body is lifted or manipulated in an unusual or unnatural manner. Lower back strain can occur when:

- The lifting requirements on this job are minimal. For example, little lifting is required, the weights lifted are light, the lifting and carrying tasks are designed appropriately, etc.
- The lifting requirements on this job are moderate. For example, some lifting is required, but the weights lifted are usually not excessive, and the lifting and carrying tasks are not usually unacceptably, etc.
- The lifting requirements on this job are excessive. For example, much lifting is required, and/or the weights lifted are sometimes excessive, and/or lifting and carrying tasks are poorly designed, etc.

3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

**Comments:**

8. **Posture, lower back:** To what extent does the job avoid requiring any posture or movement that may have an adverse effect on the lower back? In other words, avoid any kind of bent or unnatural posture, minimize moments acting on the vertebral column, avoid excessive torsional movements under a load, avoid the need for extensive side-stepping, etc.

5. The job **frequently** requires any posture or movements that may have an adverse effect on the lower back. That is, these postures and movements are frequent or infrequently, required in the performance of the primary tasks.

3. The job **occasionally** requires postures or movements that may have an adverse effect on the lower back. That is, these postures and movements are infrequently required in the performance of the primary tasks.

1. The job **very seldom** requires postures or movements that may have an adverse effect on the lower back. That is, these postures and movements are rarely or continuously required in the performance of the primary tasks.

3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

**Comments:**

9. **Muscular adequacy:** To what extent does the design of the job maintain muscular adequacy? In other words, avoid muscular insufficiency, avoid antagonistic fatigue, use the appropriate muscle group, use the preferred hand, do not allow skilled activities to require excessive muscular exertion, distribute workload among teams, etc.

5. The job **almost always** allows muscular adequacy to be maintained. None of the above or similar recommendations are violated, and the condition is not frequent or long-term.

1. The job **frequently** does not allow muscular adequacy to be maintained. Many of the above or similar recommendations are regularly violated, and the condition is frequent or long-term.

3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

**Comments:**

10. **Wrist:** To what extent does the job allow the wrists to remain straight and free of excessive movement?

5. The job requires a limited amount of wrist bending or movement. Performance of the primary tasks allow the wrists to remain straight with little movement most of the time.

3. The job requires a moderate amount of wrist bending or movement. Performance of the primary tasks requires some wrist bending and movement, but it is not excessive or continuous.

1. The job requires a great amount of wrist bending or movement. Performance of the primary tasks requires much wrist bending and movement on an excessive or continuous basis.

3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

**Comments:**

11. **Stress concentration:** To what extent is the worker protected from various forms of stress concentration? For example, avoid the transmission of stress on bones and joints (e.g., many finger-grooved tools damage bones in hands), avoid pregnancy (e.g., cutoff of blood in hands or legs), make sure floors are insulated or provided with a mat, make sure surfaces of objects or machines are same temperature as air, or else insulate them, make sure handles and controls are insulated or padded, etc.

5. The worker is exposed to a limited amount of stress concentration on this job. None of the above or similar recommendations are violated, and the stress concentration is frequent, excessive, or long-term.

3. The worker is exposed to a moderate amount of stress concentration on this job. One or more of the above or similar recommendations are violated, but the stress concentration is not frequent, excessive, or long-term.

1. The worker is exposed to a great amount of stress concentration on this job. One or more of the above or similar recommendations are violated, and the stress concentration is frequent, excessive, or long-term.

3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

**Comments:**

12. **Vibration:** To what extent is the vibration impacting the human body kept to a reasonable level? In other words, is the vibration produced by equipment, tools, etc., that has an impact on various body components (e.g., feet, hands, body) or parts that must be kept to reasonable levels and durations to avoid any adverse physiological effects?

5. The worker is exposed to a limited amount of vibration on this job. Either the worker is exposed to non-trivial vibration, or the vibration is small in magnitude and short in duration.

3. The worker is exposed to a moderate amount of vibration on this job. The vibration is either moderate to significant, or the vibration is small in magnitude but long in duration, or small in magnitude but long in duration.

1. The worker is exposed to a great amount of vibration on this job. The vibration is large in magnitude, and moderate to long in duration.

3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

**Comments:**
1. Work area lighting--general: To what extent is the work area adequately illuminated and appropriately colored? In other words, is the general level of lighting sufficient and is the light source appropriate for the task? Are the work area walls, ceilings, etc., brightly colored? Are the work area colors blends of color and lighted sufficiently to enhance visual acuity? Are colors used to provide orderliness, to identify safety devices, to make a pleasant environment, etc.?

2. Work area illumination and coloring are fully adequate on this job. There are no significant violations of the above recommendations. Comments: Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

3. Work area illumination and coloring are less than adequate on this job. There are minor violations of the above recommendations, and they create a hindrance to performance of the job.

4. Work area illumination and coloring are inadequate on this job. There are major violations of the above recommendations, and they cause a major hindrance to performance of the job.

5. Control and display identification: To what extent are the controls and displays adequately identified? In other words, to what extent can the controls and displays be identified by one or more of the following: labeling, location, grouping, size, shape, color, etc.?

6. Control and displays on this job are very adequately identified. Two or more of the above identification methods are used, and misidentification is very unlikely.

7. Control and displays on this job are adequately identified. One or more of the above identification methods are used, but misidentification is possible, although probably not frequent.

8. Control and displays on this job are inadequately identified. Identification is poor or confusing, and misidentification is likely.

9. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

10. Display visibility/legibility: To what extent are the displays on this job highly visible and legible? In other words, are the displays easy to see given viewing distance and angle, illumination level, contrast, display size, etc.?

11. Displays on this job are highly visible and legible. Nearly all of the above considerations are satisfied, and difficulty in reading the displays is unlikely.

12. Displays on this job are marginally visible and legible. Many of the above considerations are satisfied, and ease and difficulty in reading the displays is possible, although probably not frequent.

13. Displays on this job are visually visible and legible. Many of the above considerations are not satisfied, and difficulty and difficulty in reading the displays is likely.

14. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

15. Display as information content: To what extent do the displays present information content of the appropriate quality and quantity? In other words, do the displays use the least precise scales that fulfill the needs of the job? Do the displays present the information that is needed in an immediate useful form without mental conversion? Are the displays supplemented by appropriate e.g., monitoring, briefing, searching, given the nature of the information, etc., quality. quantitative, given the needs for setting, tracking, check reading, etc.?

16. The displays on this job present highly appropriate information content. All the above considerations are satisfied, and some improvements are possible.

17. The displays on this job present marginally appropriate information content. One or more of the above considerations is insufficient, and much improvement is possible.

18. The displays on this job present marginally appropriate information content. All the above considerations are not satisfied, and much improvement is necessary.

19. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)
4. Control/display movement relationships: To what extent are the movements of controls and the relationships between controls and their associated displays logical? Also, the following functions - control action rules should be met.

- **Velocity:**
  - **Control F-Plan**
  - Up, right, forward, pull
  - Down, left, rearward, push
  - Right, clockwise, right
  - Left, counterclockwise, left
  - Up, forward
  - Down, rearward
  - Extend, forward, clockwise, down
  - Decrease, right, up, forward
  - Decrease, left, down, rearward

5. The control movements and C/D movements relationships on this job are **very appropriate**. None of the above considerations are violated.

6. The control movements and C/D movement relationships on this job are **adequate**. There are minor violations of the above recommendations, but errors or significant problems are not likely.

7. The control movements and C/D movement relationships on this job are **inadequate**. There are major violations of the above recommendations, and errors or significant problems are likely.

8. **Highly relevant**. 2. **Minimally relevant**. 1. **Irrelevant (not rated)**

9. **Comments:**

10. Control resistance/feedback: To what extent do the controls provide appropriate resistance? Adequate response feedback. In other words, are the types and levels of resistance and other forms of feedback (e.g., sound, force) correct? Controls and control activation feedback requirements for FE (control activation feedback, performance requirements for FE, control activation feedback, performance support, etc.) are met. The resistance/feedback on this job are **highly appropriate**. All of the above considerations are satisfied.

11. The resistance/feedback of the controls on this job are **minimally appropriate**.

12. The resistance/feedback of the controls on this job are **inappropriate**.

13. The resistance/feedback of the controls on this job are **inappropriate**. Many of the above considerations are not satisfied, and operating problems or inconveniences are likely.

**Highly relevant**. 2. **Minimally relevant**. 1. **Irrelevant (not rated)**

14. **Comments:**

15. Controls - anthropometric/biomechanical: To what extent are the controls designed to fit into the tasks involved and take into account the anthropometric and biomechanical considerations? In other words, are the controls designed to meet the requirements of the least capable operator? Are there sufficient distances between controls to allow for the size and reach requirements of the limbs? Are the control's shapes and size appropriate? Are the controls designed to prevent injuries to the limbs involved when operating the controls? Controls designed to prevent biomechanical strain in the design of the controls? Controls designed to take account of the anatomy of the limb (e.g., muscular, neural, etc.)? Controls designed to take account of the task and human capabilities? Controls designed to take account of the task and human limitations? Controls designed to take account of the task and human performance limitations?

**Highly relevant**. 2. **Minimally relevant**. 1. **Irrelevant (not rated)**

**Comments:**
11. Controlling Motion Economy: To what extent are the controls designed to allow the economy of movement? In other words, are the number of controls kept to a minimum necessary? Are the same controls combined to reduce movement if possible? Can the operator minimize the use of controls by making movements as simple and easy as possible? Is the operator able to control the movements of the parts necessary for the operation? Is the control system designed so that the operator can keep one hand on the controls and still reach the part of the machine to which the controls are attached? Are the controls arranged so that the operator can use both hands to control the machine? 

5. The controls on this job are designed to allow a great deal of motion economy. Nearly all the above considerations are satisfied.

3. The controls on this job are designed to allow moderate motion economy. Some of the above considerations are not well satisfied, but this creates only minor additional effort for the worker.

1. The controls on this job are designed to allow very little motion economy. Many of the above considerations are not satisfied, and this creates much additional effort for the worker.

Comments: Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

12. Warning Devices: To what extent are warning devices appropriately designed? In other words, to what extent do the warning devices (e.g., lights, alarms) attract the attention of a busy or bored operator? Are the lights or alarms too bright or too weak? Do they tend to induce fatigue? Are any of the warning devices likely to fail or give false signals?

5. The warning devices on this job are highly appropriate. They satisfy all of the above considerations.

3. The warning devices on this job are minimally appropriate. None of the above considerations are well satisfied, but this does not create any major problems; dangers, or inconveniences.

1. The warning devices on this job are inappropriate. They violate some of the above considerations, and they create significant problems, dangers, or inconveniences.

Comments: Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

13. Listed Job Materials: To what extent are printed job materials designed to be highly readable? In other words, are printed job materials such as orders, instructions, manuals, checklists, labels, decals, graphs, tables, scales, etc., laid-out well and easy to read and interpret? Are the materials legible, the content appropriate, the reading level reasonable, the layout sensible, the color schemes and graphs appropriate, etc.

5. The printed materials on this job are highly readable and interpretable. That is, there are no major problems with any of these attributes. The material does not result in errors or detract significantly from their utility.

3. The printed materials on this job are minimally readable and interpretable. That is, there are some minor problems, but this does not result in errors or detract significantly from their utility.

1. The printed materials on this job are highly readable and interpretable. That is, there are some major problems, and this could result in errors or detract significantly from their utility.

Comments: Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

14. Panel Layout: To what extent are control/display panels laid-out in a logical and clear manner? The relationships between each control/display pair must be readily discernible through the use of grouping, location, positioning, ordering, labeling, etc. In terms of the entire panel, controls should be grouped based on function, sequence, frequency of use, standardization, ease of cleaning, etc. Also, location priorities and distance should be considered. Display should be located to provide only part of a display and reach body movement.

5. The C/D panels on this job are laid-out in a highly logical and clear manner. The relationships between each C/D pair are identified by two or more criteria; the functions, and controls are grouped in terms of two or more criteria; and the location priorities are considered.

3. The C/D panels on this job are laid-out in a moderately logical and clear manner. One or more of each set of criteria are satisfied, but some confusion is possible, although probably not frequent.

1. The C/D panels on this job are not laid-out in a logical and clear manner. Few of the criteria are satisfied, and confusion and errors seen infrequently.

Comments: Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

15. Input Requirements: To what extent are the information input requirements on the job within the limitations of the least capable potential worker? In other words, considering all forms of information input, must be assessed and perceived to effectively perform the job, does the quality of information, the rate presented, the quality of information, the rate presented, the quality of information, the rate presented, etc. result in job requirements that could be met by the least capable potential worker?

5. The information input requirements on this job are minimal. They are within the capabilities of nearly all potential workers, and require little mental effort or training/experience.

3. The information input requirements on this job are moderate. They are within the capabilities of the average potential worker, but require some mental effort and/or training/experience.

1. The information input requirements on this job are considerable. They are within the capabilities of only the above average potential worker, and require much mental effort and/or training/experience.

Comments: Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

16. Output Requirements: To what extent are the output requirements on the job within the limitations of the least capable potential worker? In other words, considering all forms of output (e.g., both action and decision, that the worker must act to effectively perform the job), do the requirements for amount, rate, and accuracy, exceed the capabilities of the least capable potential worker? Are the requirements for precision, accuracy, etc. beyond the capabilities of the least capable potential worker? Do the requirements for endurance and strength exceed the capabilities of the least capable potential worker? But with psychomotor or informational types of output?

5. The output requirements on this job are minimal. They are within the capabilities of nearly all potential workers, and require little mental effort or training/experience.

3. The output requirements on this job are moderate. They are within the capabilities of the average potential worker, but require some mental effort or training/experience.

1. The output requirements on this job are considerable. They are within the capabilities of only the above average potential worker, and require much mental effort and/or training/experience.

Comments: Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)
17. Information processing: To what extent are the information processing requirements on the job within the limitations of the least capable worker? In other words, considering all forms of thinking, decision making, and problem solving necessary for the job, does the amount and difficulty of the processing result in requirements that could be met by the least capable worker?

3. The information processing requirements on this job are minimal. They are within the capabilities of nearly all potential workers, and require little mental effort or training/experience.

1. The information processing requirements on this job are considerable. They are within the capabilities of only the above average potential worker, and require much mental effort and/or training/experience.

2. Highly relevant 3. Minimally relevant 1. Irrelevant (not rated)

Comments:

18. Memory requirements: To what extent are the memory requirements on this job within the limitations of the least capable worker? In other words, considering the demands on both short and long term memory necessary to effectively perform the job, does the quantity of information to be remembered, the length of time it must be retained, the ease with which it can be recalled, etc., result in requirements that could be met by the least capable worker?

3. The memory requirements on this job are minimal. They are within the capabilities of nearly all potential workers, and require little mental effort or training/experience.

1. The memory requirements on this job are considerable. They are within the capabilities of only the above average potential worker, and require much mental effort and/or training/experience.

2. Highly relevant 3. Minimally relevant 1. Irrelevant (not rated)

Comments:

19. Boredom: To what extent is the job designed to avoid boredom? In other words, is boredom a frequent problem on this job? Are there repetitive and monotonous tasks, and does the variety of stimulation and activity provided to workers on this job prevent boredom from occurring?

5. Significant boredom is possible but uncertain on this job. There are some repetitive and monotonous tasks, and some variety of stimulation and activity, but the level of boredom is uncertain.

3. Significant boredom is very likely on this job. There are many repetitive and monotonous tasks, and the level and variety of stimulation and activity are low. Worker boredom is highly probable.

2. Highly relevant 3. Minimally relevant 1. Irrelevant (not rated)

Comments:

20. Stress: To what extent is the job designed to maintain an optimal level of stress? That is, does the job provide a sufficient level and variety of stimulation and activity to maintain a comfortable and productive level of stress, or is it too high or too low? Is the level of stress too low, or not enough, or is it too high or too intense?

5. The job maintains a high level of stress. The job provides a sufficient level of stimulation and activity so that the job provides a high and consistent level of stress, and the level of stress is neither too low nor too high.

3. The job maintains a moderate level of stress. The levels of stimulation and activity are neither too high nor too low, but the level of stress is not too high.

1. The job maintains an inappropriate level of stress. The levels of stimulation and activity are either too high or too low, and the level of stress is inappropriate.

2. Highly relevant 3. Minimally relevant 1. Irrelevant (not rated)

Comments:

21. Work environment - safety: To what extent are special safety features designed into the workplace surrounding this job? For example, are all work areas adequately illuminated? Is there a "no exit" marking used where appropriate? Are adequate handrails and safety chains used where appropriate? Are all machine guards and safety devices used where appropriate? Are all machine guards and safety devices used where appropriate?

3. Significant stress is possible but uncertain on this job. One or more of the above sources of stress may exist, but it does not cause excessive stress on a frequent or long-term basis.

1. Significant stress is very likely on this job. Some of the above sources of stress do exist, and significant resulting stress on the workers is highly probable.

2. Highly relevant 3. Minimally relevant 1. Irrelevant (not rated)

Comments:

22. Work environment - security: To what extent are special security features designed into the workplace surrounding this job? For example, are all work areas adequately illuminated? Are there "no exit" markings used where appropriate? Are all machine guards and safety devices used where appropriate? Are all machine guards and safety devices used where appropriate?

5. There are a great number of safety design features in the workplace surrounding this job. No departures from the above recommendations are not recommended in this job. No departures from the above recommendations are not recommended.

3. There is a considerable number of safety design features in the workplace surrounding this job, but departures from the above recommendations, but no significant safety risks are created.

1. There is a moderate number of safety design features in the workplace surrounding this job, and some major departures from the above recommendations, and significant safety risks may be created.

2. Highly relevant 3. Minimally relevant 1. Irrelevant (not rated)

Comments:
23. **Workplace layout — visual and auditory links:** To what extent have visual and auditory links been considered in the design of this workplace? In other words, can the worker see as well (e.g., within the field of vision of the workplace, other people, other equipment, etc.) and can the worker hear well (e.g., oral communications, i.e., speakers, earphones, warning signals, equipment operation, etc.)?

5. Visual and auditory links have been given great consideration in the design of this workplace. The worker can see and/or hear all relevant stimuli.

3. Visual and auditory links have been given adequate consideration in the design of this workplace. Some of the links are impaired, but the worker can see and/or hear all the task-critical stimuli.

1. Visual and auditory links have been given limited consideration in the design of this workplace. Many of the links are impaired, including some of the links important to effective job performance.

3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

Comments:

24. **Maintainability — access:** To what extent is there sufficient access for maintenance purposes? In other words, is there enough room for the technician to gain access to the equipment or component, is there enough clearance to use tools, is there enough room for removal and replacement of components (e.g., without having to remove other components), are all sides of the equipment accessible, are inspection panels properly located and are fasteners designed to be reliable and easy to operate, is there adequate visual access to the equipment, is the equipment cost with all types of maintenance, including inspection, troubleshooting, adjusting, replacing, repairing, and servicing.

5. Access for maintenance is fully adequate on this job. Most of the above considerations are satisfied, and access is rarely a problem.

3. Access for maintenance is minimally adequate on this job. Some of the above considerations are not well satisfied; access occasionally is a problem, but usually it is just an inconvenience.

1. Access for maintenance is less than adequate on this job. There are some major problems with the above considerations, and access is frequently a significant problem.

3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

Comments:

25. **Maintainability — information/labeling:** To what extent are there sufficient information and labeling for maintenance purposes? In other words, is there enough information available for maintenance in the form of procedures and job aids (e.g., manuals, handbooks, instructions, checklists, schematics, diagrams, etc.), are the instructions clear and appropriate? Are there sufficient labeling for identification (e.g., of units, parts, controls, displays, test points, etc.) and for the presentation of critical maintenance procedures or safety information?

5. Information and labeling for maintenance are fully adequate on this job. The above considerations are satisfied, and information/labeling is rarely a problem.

3. Information and labeling for maintenance are minimally adequate on this job. The above considerations are not fully satisfied; information/labeling is occasionally a problem, but usually it is just an inconvenience.

1. Information and labeling for maintenance are less than adequate on this job. The above conditions are not satisfied, and information/labeling is frequently a significant problem.

3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

Comments:

26. **Maintainability — tools and equipment:** To what extent are there sufficient tools and equipment for maintenance purposes? In other words, are the correct tools and equipment available for all the maintenance needs, is the need for special purpose tools and equipment reasonable, is there adequate maintenance support equipment (e.g., vehicles, stands, dollies, etc.)?

5. Tools and equipment for maintenance are fully adequate on this job. All the above considerations are satisfied, and tools and equipment are rarely a problem.

3. Tools and equipment for maintenance are minimally adequate on this job. Some of the above considerations are not well satisfied, tools and equipment are occasionally a problem, but usually they are just inconvenient.

1. Tools and equipment for maintenance are less than adequate on this job. The above considerations are not satisfied, and tools and equipment frequently impose significant problems.

3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

Comments:

27. **Maintainability — safety:** To what extent are there special design features to promote safety in maintenance? For example, do access doors, covers, handles, etc., have rounded corners and edges; are sharp edges and sharp protruding objects, etc., removed, protected, or made safe; are warning labels used where necessary (e.g., on access doors leading to high voltage areas)? Are access covers that are not completely removable, self-supporting in the open position? Are units in excess of 45 ft. high portable or pinned to the building? Are there adequate provisions for the use of personal protective equipment? Are there provisions for the use of personal protective equipment; are all necessary safety equipment, fire extinguishers, portable fire extinguishers, etc., available?

5. There are a great number of design features on this job to promote safety in maintenance. Nearly all the above recommendations are satisfied.

3. There are a considerable number of design features on this job to promote safety in maintenance. There are some minor departures from the above recommendations. But there are no significant safety risks.

1. There are a modest number of design features on this job to promote safety in maintenance. There are some major departures from the above recommendations, and significant safety risks may be created.

3. Highly relevant 2. Minimally relevant 1. Irrelevant (not rated)

Comments: