Gross and fine manipulation

The Occupational Requirements Survey (ORS) publishes job-related information on physical demands; environmental conditions; education, training, and experience; as well as cognitive and mental requirements. The job requirements reflect those necessary for workers to perform critical tasks in support of the critical job functions, and not the capabilities of individual workers. Gross and fine manipulation estimates are physical demand requirements. Where possible, the ORS program provides whether one or both hands are necessary to perform gross and fine manipulation as well as the duration associated with each job requirement by occupation.

Gross manipulation is defined as seizing, holding, grasping, turning, or otherwise working with hand(s). This includes instances when fingers are used as an extension of the hand to hold or operate a tool.

Examples of gross manipulation include:

- teachers using board erasers;
- goalies turning hockey sticks;
- welders using tin snips;
- truck drivers operating steering wheels and gear shifts.

Fine manipulation is defined as picking, pinching, touching or otherwise working primarily with fingers rather than the whole hand or arm. The ORS program considers the job requirement of entering data on traditional keyboards or 10-key pads as a keyboarding requirement, as this is excluded from fine manipulation.

Examples of fine manipulation include:

- musicians playing pianos or keyboards;
- bartenders entering drink orders into touch screen point-of-service systems;
- cashiers using a register with hybrid keyboards;
- dental hygienists using tools to scrape tartar off of patients’ teeth;
- scientists using pipette to dispense solutions;
- electricians using small tools to rewire lamps.

There are many situations where multiple physical demands are performed concurrently, including both gross and fine manipulation. The ORS program captures these requirements separately. Some examples of both requirements being present include:

- receptionists making phone calls may include gross manipulation (holding the receiver with one hand) and fine manipulation (dialing the phone with the other hand);
- cashiers ringing up customers may include gross manipulation (moving product off conveyor belt) and fine manipulation (returning change and receipt);
- warehouse clerks may have to lift boxes off conveyor belts (gross manipulation), and then enter the serial numbers from boxes using touchscreen scanners (fine manipulation);
- writing is included in both gross and fine manipulation.

In 2021, gross manipulation was required for 99.9 percent of all civilian workers and fine manipulation was required for 98.6 percent of civilian workers. (See Chart A.)
Included in the gross and fine manipulation requirements is whether jobs require workers to perform these physical demands using one hand or both hands. Generally, the sum of performing gross and fine manipulation with one hand and both hands will equal the overall requirement. For example, 100 percent of maids and housekeeping cleaners required gross manipulation and all these workers required both hands to perform gross manipulation. Fine manipulation was required for 96.0 percent of maids and housekeeping cleaners with one hand required for 22.4 percent and both hands required for 73.6 percent. Sometimes the total does not equal the overall requirement due to rounding or because one or both estimates are not available, which occurs if they do not meet publication criteria or there are no workers with the requirement.

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Gross manipulation</th>
<th>Fine manipulation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Required</td>
<td>One hand</td>
</tr>
<tr>
<td>Software developers</td>
<td>99.5</td>
<td>39.0</td>
</tr>
<tr>
<td>Chief executives</td>
<td>100.0</td>
<td>29.4</td>
</tr>
<tr>
<td>Computer and information systems managers</td>
<td>99.7</td>
<td>37.7</td>
</tr>
<tr>
<td>Elementary school teachers, except special education</td>
<td>99.9</td>
<td>13.5</td>
</tr>
<tr>
<td>Food preparation workers</td>
<td>100.0</td>
<td>-</td>
</tr>
<tr>
<td>Cashiers</td>
<td>100.0</td>
<td>-</td>
</tr>
<tr>
<td>Security guards</td>
<td>100.0</td>
<td>10.7</td>
</tr>
<tr>
<td>Maids and housekeeping cleaners</td>
<td>100.0</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: Dash indicates no workers in this category or data did not meet publication criteria.

Duration estimates

Gross and fine manipulation duration estimates are categorized by portion of the workday spent performing these physical demands. For example, if over the course of an 8 hour workday (480 minutes) workers lift boxes for less than 5 minutes, gross manipulation would be classified as “seldom,” assuming no other gross manipulation is performed. However, if they lifted boxes for 1 hour each work day, then gross manipulation occurs “occasionally.”

Generally the sum of the duration estimates sums to the overall requirement (gross and fine manipulation). Additionally, the sum of the duration estimates and the not present estimate generally sum to 100 percent.

<table>
<thead>
<tr>
<th>Duration</th>
<th>Amount of work day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seldom</td>
<td>Up to 2 percent of the workday</td>
</tr>
<tr>
<td>Occasionally</td>
<td>2 percent up to 1/3 of the workday</td>
</tr>
<tr>
<td>Frequently</td>
<td>1/3 up to 2/3 of the workday</td>
</tr>
<tr>
<td>Constantly</td>
<td>2/3 or more of the workday</td>
</tr>
</tbody>
</table>

The duration of gross and fine manipulation varies amongst occupations. For example, 8.1 percent of office clerks seldom performed gross manipulation, 65.7 percent of construction managers did occasionally, 64.3 percent of dental assistants did frequently, and 40.3 percent of maids and housekeeping cleaners did constantly. Fine manipulation was performed seldom by 24.8 percent of office clerks, occasionally by 72.6 percent of construction managers and frequently by 37.7 percent of dental assistants.

Additional resources:

- Latest news release
- Archived ORS news releases
- Handbook of Methods
- Collection manuals
- Factsheets

Articles:

- Use of personal protective equipment to mitigate noise exposure in 2020
- Civilian occupations required to spend the most time outdoors in 2020
- Sitting and standing requirements in 2020
- Job requirements for animal caretakers on National Mutt Day
- Three-fourths of workers had to interact with the public in 2019; 4.3 percent worked around crowds
- Physical requirements in food preparation and serving jobs
- Job requirements and wages for auto mechanics in 2018
- Occupational requirements and benefits for nurses in the United States in 2018
- All The Economics Daily (TED) articles on ORS
- A look at teachers’ job requirements, employer costs, and benefits (PDF)
- Occupational Requirements Survey: results from a job observation pilot test
- The Occupational Requirements Survey: estimates from preproduction testing

For additional information on occupational requirements see the ORS homepage or download the ORS complete dataset to explore the latest estimates.