



The California Janitor Workload Study

Using Time Motion Methods to Compare Actual Time Spent on Tasks with Industry Recommended Time Allocations

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Background

- 278,000 janitors in California¹
- High prevalence of pain and injury among janitors
 - Incidence rate per 10,000 full-time equivalent (FTE) workers was 191.6²
- Exposures from cleaning tasks have been associated to increased risk of work-related musculoskeletal disorders (WMSDs)³
- Disinfection requirements increased during COVID-19⁴

¹ UCLA Labor Center. (2022). *Profile of janitorial workers in California 2022*. <https://www.labor.ucla.edu/wp-content/uploads/2022/12/221205-UCLAReport.pdf>

² U.S. Bureau of Labor Statistics. *Janitors and cleaners, except maids and housekeeping cleaners, 2016-2020*. <https://www.bls.gov/iif/snapshots/osn-janitors-and-cleaners-except-maids-and-housekeeping-cleaners-2016-20.htm>

³ Lee, W., Lin, J.-H., Howard, N., & Bao, S. (2022). Methods for measuring physical workload among commercial cleaners: A scoping review. *International Journal of Industrial Ergonomics*, 90, 103319–103319.

² <https://doi.org/10.1016/j.ergon.2022.103319>

⁴ Wilson, A. M., Jung, Y., Mooneyham, S. A., Klymko, I., Eck, J., Romo, C., Vaidyula, V. R., Sneed, S. J., Gerald, L. B., & Beamer, P. I. (2023). COVID-19 cleaning protocol changes, experiences, and respiratory symptom prevalence among cleaning services personnel. *Frontiers in public health*, 11, 1181047. <https://doi.org/10.3389/fpubh.2023.1181047>



Background

International Sanitary Supply Association (ISSA)¹ provides time recommendations based on:

- Space (area, fixtures etc)
- Task
- Tool



¹ The ISSA Clean Standards. (2019, February 4). ISSA. <https://www.issa.com/certification-standards/issa-clean-standards>

Objectives

To compare the ISSA time allocation to the actual time spent cleaning at four different venues by space and task.

To quantify the difference between observed time to ISSA time allocations for individual workers.

Methods – Study Design and Participants

Four venues

- Venue 1: Mall (N=7)
- Venue 2: Airport (N=4)
- Venue 3: Event/Convention (N=13)
- Venue 4: Office (N=1)

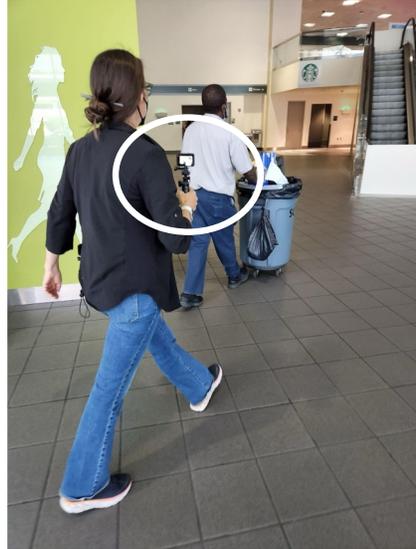
Video-taped and kept a diary of tasks for each worker for two full cycles of work or up to 4 hours

Wearable devices were largely refused

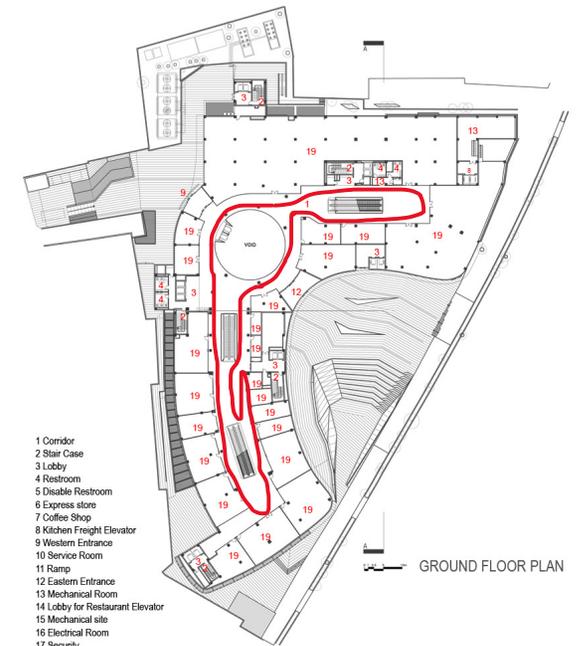
Methods – Data Collection



Handheld
Camera



Direct
Measurements



Floor Plan
Estimates

Gallery of ARG Shopping Mall / ARSH 4D Studio - 25. (2020). ArchDaily. <https://www.archdaily.com/783535/arg-shopping-mall-arsh-4d-studio/56e0ef01e58ece0867000067-arg-shopping-mall-arsh-4d-studio-ground-floor-plan>



Methods - Video Analysis

Multi-Video Task Analysis (MVTA)

- *NexGen, Inc, University of Wisconsin, IL*

The screenshot displays a video analysis software interface. On the left, a 'Records' panel lists four categories: '1: Task' (highlighted in blue), '2: Space', '3: Right Hand Tool', and '4: Left Hand Tool'. Above the video frame, a 'Frame#' field is visible. The central video frame shows a person in an orange shirt working at a desk in an office setting. A yellow circle highlights the person's head. A timestamp '07:32:22:34' is overlaid on the bottom of the video frame. On the right, an 'Events' legend lists various activities with corresponding colored boxes: D (Dry Mopping), #2 (Dusting), #3 (Disinfecting), #4 (Wet Mopping), #5 (Sweeping), #6 (Litter Pick Up), #7 (Trashing), #8 (Resupply), #0 (Walking), #9 (Transport), A (Standing), B (Furniture Moving), C (PPE), and W (Wiping).

Methods - Video Analysis

Venue-Specific Vocabulary List

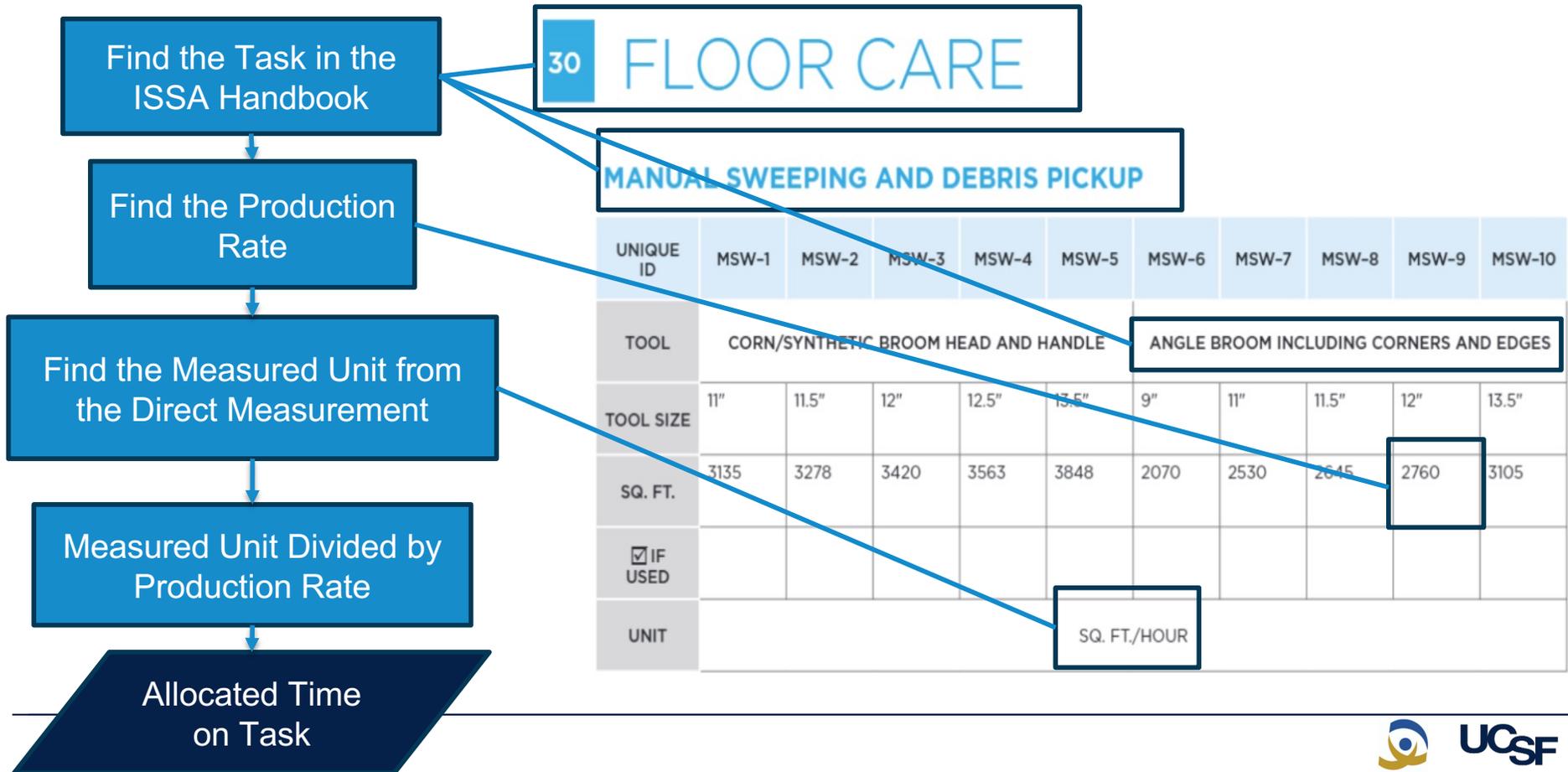
Space

Bathroom General, Hallway/Walkway, Common Space, Outdoor, Cafeteria/Lounge/Kitchen, Office/Cubicle, Supply Closet, Janitorial Storage, Trash area/Recycling area, Meeting Room, Elevator, Escalator, Breaktime

Task

Washing Windows, Washing/Cleaning Mirrors, Wet Mopping, Dry Mopping, Sweeping, Litter Pick Up, Disinfecting/Scrubbing, Dusting, Wiping, Trashing, Resupply, Transport, Walking, Standing, Furniture Moving, PPE, Vacuum Cleaning, Cleaning toilet, Cleaning sink, Breaktime

Methods - ISSA Time Allocation



Methods - ISSA Time Allocation

UNIQUE ID	TASK	TOOL	TIME		
			sq. ft.	minutes	seconds
UFH-1	Clean	Spray bottle, chemical, and cloth	25	1.86	111.60
UFH-2	Disinfect	Spray bottle, chemical, and cloth	25	1.86	111.60
UFH-3	Dust	Telescopic duster and sleeve	25	0.14	34.00
UFH-4	Polish	Spray bottle, chemical, and cloth	25	2.25	135.00

UFH: Hard Surface Furniture Cleaning

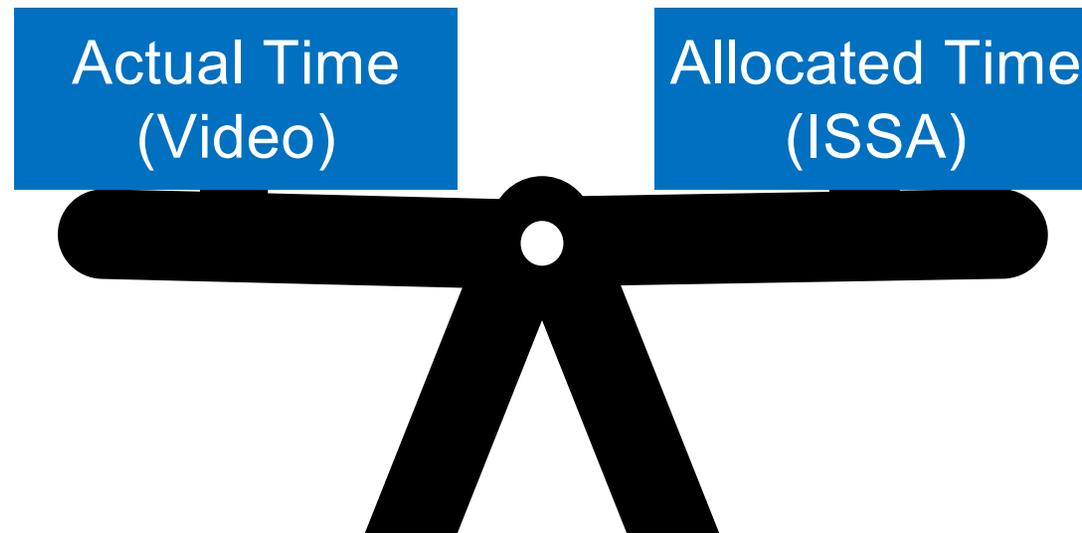
Methods - ISSA Time Allocation



UNIQUE ID	TASK	TOOL	TIME		
			unit	minutes	seconds
RCL-5	Empty trash, clean and disinfect fixtures, wipe mirrors, replace supplies, and sweep floor	Restroom cart, trash liners, consumable supplies, chemical, cleaning cloths, broom, and dustpan	Per fixture	1.64	98.33
RCL-6	Empty trash, clean and disinfect fixtures, wipe mirrors, replace supplies, dust, sweep, and wet mop floor	Spray-and-vacuum machine, trash liners, consumable supplies, chemical, cleaning cloths, broom, and duster	Per fixture	2.32	139.00

RCL: Restroom Cleaning

Methods - Compare Actual to Allocated



Methods - Compare Actual to Allocated

	Venue:	Mall (Roseville)	ISSA Production Rate			Measured Units		ISSA Time	Observed Time	
Subject#	Space	Task	Section #	Rate	Unit	Meas.	Unit	(min)	MVTA (sec)	MVTA (min)
1	Cafe/Lounge/Kitchen	Disinfecting/Scrubbing	UHF-2	13.4	sq.ft./min.	1481.55	sq.ft.	110.20	4308.00	71.8
1	Cafe/Lounge/Kitchen	Litter Pick up	LDT-1	276.2	sq.ft./min.	8637	sq.ft.	31.30	1668.00	27.8
1	Bathroom	All Bathroom	RCL-5	1.6	min./fixture	23	fixture	37.70	3234.00	53.9

Methods - Compare Actual to Allocated

Venue:	Method	Ratio (ISSA/Actual)	Deviation (MVTA-ISSA)/ISSA	Difference MVTA - ISSA (min)	Pace (Worker)
Space	Task				
Cafe/Lounge/Kitchen	Disinfecting/Scrubbing	1.54	-35%	-38.40	Faster
Cafe/Lounge/Kitchen	Litter Pick up	1.12	-11%	-3.50	Faster
Bathroom	All Bathroom	0.7	43%	16.20	Slower

Absolute percentage deviation was calculated using the following the equation:

$$\text{Absolute percentage deviation} = \left| \frac{\text{Standard time} - \text{Observed time}}{\text{Standard time}} \right| \times 100$$

Results

Summary of Time Allocation Across All Venues (N=24)

	Airport (N=4)	Mall (N=7)	Convention (N=13)
Task	Common Space (32%), Bathroom General (24%), Cafeteria (17%)	Common Space (29%), Bathroom General (27%), Cafeteria (15%)	Common Space (47%), Outdoor (15%), Janitorial Storage (13%)
Space	Trashing (19%), Disinfecting (17%), Transport (16%)	Transport (17%), Trashing (15%), Wiping (11%)	Washing window (18%), Furniture Moving (16%), Vacuum Cleaning (15%)

Results- Space

All Venues	observed < ISSA (worker used less time)		observed > ISSA (worker used more time)	
	Samples (N)	% deviation average (SD)	Samples (N)	% deviation average (SD)
Common Space	18	37 (21)	23	65 (46)
Bathroom General	8	20 (21)	4	22 (19)
Cafe/Lounge/Kitchen	4	30 (19)	2	105 (138)
Outdoor	6	42 (29)	1	44 (0)
Janitorial Storage	1	21 (0)	3	31 (18)

Results- Task

	observed < ISSA (worker used less time)		observed > ISSA (worker used more time)	
	Samples (N)	% deviation average (SD)	Samples (N)	% deviation average (SD)
All Bathroom	8	20 (21)	4	22 (19)
Transport + Walking	1	62 (0)	16	61 (30)
Washing window	1	14 (0)	3	62 (48)
Disinfecting/Scrubbing	2	27 (12)	4	45 (26)
Trashing	11	40 (23)	2	27 (23)
Vacuum cleaning	2	33 (9)	4	88 (94)
Wiping	0	0.00	2	151 (73)
Cleaning Escalator	3	50 (19)	1	NA

Results- Individual Level

MALL		ISSA Estimated Time	MVTA Observed Time	ISSA Job Cycle Time	MVTA Job Cycle Time	Worker Impact- Obs. Time	Worker Impact across Shift
Space	Task	(min)	(min)	(min)	(min)	(min)	(min)
Cafe/Lounge/ Kitchen	Disinfecting/ Scrubbing	110.20	71.8	179.2	153.5	-25.7	-75.3
Cafe/Lounge/ Kitchen	Litter Pick up	31.30	27.8				
Bathroom	All Bathroom	37.70	53.9				

Worker should have taken/been allocated 75.3 minutes more to clean these spaces

Results- Individual Level

	Total ISSA Estimated Job Cycle Time	Total Job Cycle Time	Worker Impact across observation time	Worker Impact across Shift
Worker	(min)	(min)	(min)	(min)
A	179.2	153.5	-25.7	-75.3
B	174.7	117.3	-57.4	-220.3
C	162.7	138.9	-23.8	-77.0
D	260.9	205.9	-55.1	-120.4
E	234.7	248.4	13.6	24.7
F	70.7	150.1	79.4	238.0
G	251.2	256.3	5.1	8.9

Discussion- Space

The ISSA time allocations varied widely by space

- Common space cleaning time was over and underestimated, though higher magnitudes of underestimation ($ISSA < Obs$) were measured
- Bathroom, café/kitchen, outdoor space more frequently overestimated ($ISSA > Obs$)
- Janitorial Closet visits more frequently underestimated ($ISSA < Obs$)

Possible that:

- usage (%capacity) should be included in time estimates
- Location of storage closets and number of trips per hour should be included

Discussion- Task

The ISSA UNDERESTIMATED (ISSA < Obs) time spent on:

- Wiping and disinfecting
- Walking/Transportation
- Vacuuming
- Washing Windows

The ISSA OVERESTIMATED (ISSA > Obs) time spent on:

- Trashing
- Bathrooms

Unclear whether workers spent less time on some tasks to compensate for inadequate time provided for other tasks.

Discussion- Individual

The difference in ISSA estimated time versus observed time varied across workers

- Four workers took less time to complete tasks than what ISSA would have allocated
- When extrapolated to a shift, could result in 1 to 4-hours of time they should have been allocated to perform the tasks they performed
- Three workers took more time than the ISSA allocated but two of those were with less than 25 minutes
- The one person who would have taken 4 hours more to complete work spent most time walking and wiping down surfaces which more often took more time than allocated per ISSA

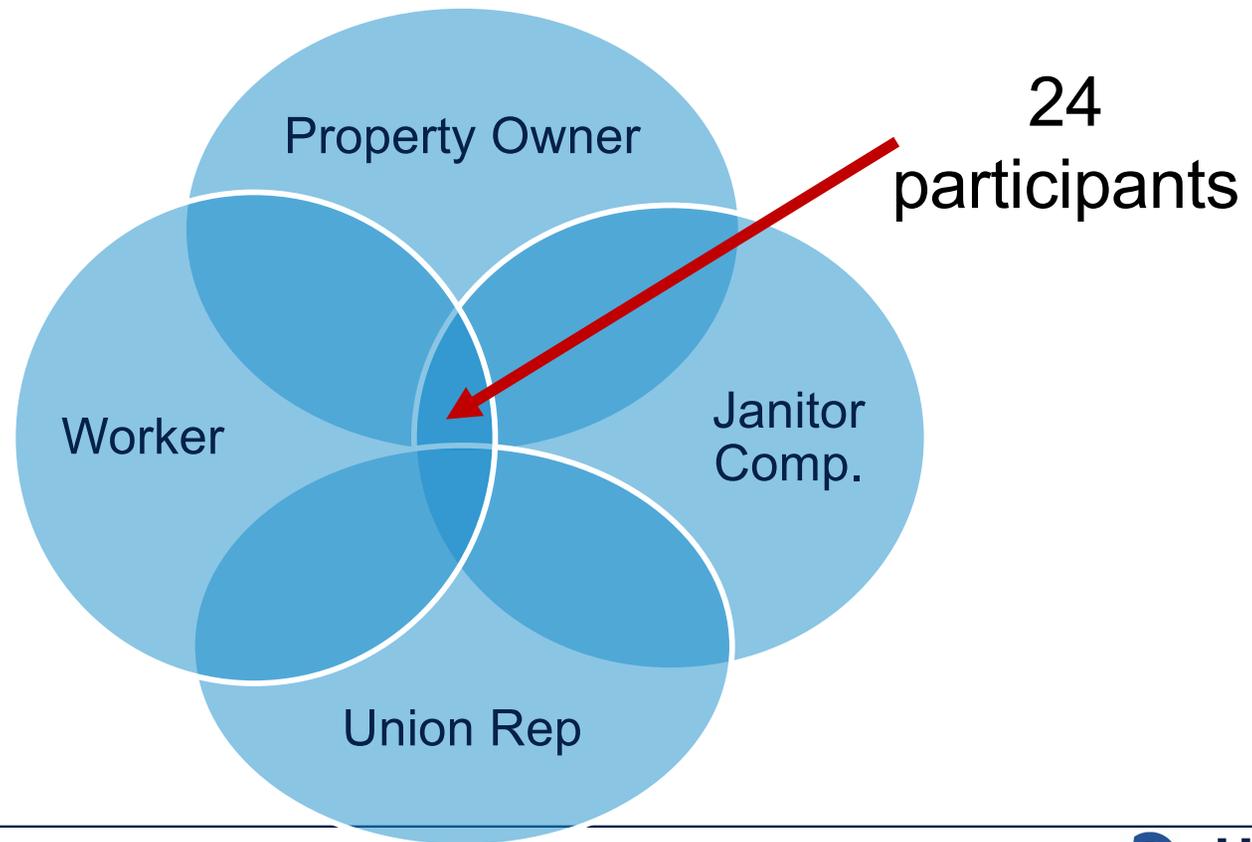
Limitations

Lacked some direct measurements for some surface area cleaned and distances transported- used maps or estimates

Many tasks, spaces, and tools observed were not described in the ISSA

- Resupply, transport furniture, street washing, folding tablecloths
- Trash and recycling area
- Rider machines

Limitations



Conclusions

Based on the observation of these Janitors:

- There are large discrepancies between ISSA allocated time on task and observed time performing tasks, particularly for disinfecting, wiping, walking, and vacuuming tasks.
- Workers spent less time cleaning bathrooms and removing trash, two tasks that could vary widely based on usage/ building capacity.
- Workers could have severe deficiencies in the time allocated to them to perform their work.
- The approach to the allocation of janitorial work needs revision to incorporate building capacity and tasks currently ignored like restocking supplies.

Next Steps

Workload Calculator¹

Management Job Planning Report

Job | Work pace | Overall workload | Hand/wrist risk | Shoulder risk | Back risk |

Production rate

The total number of hours allocated to this job is:

The standard number of hours suggested by the industry standards is:

The allocated time for the should be sufficient as it is more than the standards suggested.

The table below shows the comparisons between the allocated and time needed based on the standard times for the tasks in this job. You can go back to the data entry page to adjust either the hours allocated or the productivity rates for the tasks if needed using the button below.

Management Job Planning Report

Job | Work pace | Overall workload | **Hand/wrist risk** | Shoulder risk | Back risk |

Hand/wrist loading

The hand/wrist risk level is considered

The following table shows the task-location-tool combinations that have contributed to the hand/wrist risk level. Improvement to these tasks will be most effective.

** When there are more than 1 identical task-location-tool -variation combination on the list, it means that more than one sub-task in that task-location-tool-variation combination had significant contributions to the hand/wrist loading risk.*

Task-location-tool-variation

Damp Mopping-Hard Flooring (damp mopping)-Flat Mop (hard floor)-Use bucket, area with obstacles
Damp Mopping-Hard Flooring (damp mopping)-Flat Mop (hard floor)-Use bucket, area with obstacles
Restroom/Locker Room Cleaning-Restroom (cleaning)-Tools for cleaning surfaces, toilets, floors-Straight-handled toilet brush, string mop used
Vacuuming-Office/cubicle (vacuuming)-Backpack vacuum (office/cubicle)-None
Restroom/Locker Room Cleaning-Restroom (cleaning)-Tools for cleaning surfaces, toilets, floors-Straight-handled toilet brush, string mop used

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