

Appendix C:

Job Physical Exposure Data Collection Instruments

C.1	Position Specific Data Collection Form
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C.3	Borg CR-10 Scale
C.4	Grip/Pinch Diagram
C.5	Hand Activity Level (HAL) Scale

Appendix C.1: Position Specific Data Form

Position / Worker Specific Data Form

1. Subject I.D. _____ <AA0001> 5. Facility: _____
2. Subject Name: _____ 6. Time (24hr): _____ <2:30 pm = 14:30, midnight = 00:00>
3. Male Female 4. Age: _____ <years> 7. Date: _____ <MM / DD / YYYY>
8. Analyst #1: _____ 9. Analyst #2: _____

Position Information

10. Line / Department Title: _____
11. Position Title: _____
12. Position Description: _____
- _____
- _____

13. Typical Shift **Start** Time (24hr): _____ 17. **Typical**
M T W H F S SU **ODD WEEK**
<Check Days Worked, Write Total Hours/Day Below>
14. Typical Shift **End** Time (24hr): _____
15. Break-Time (Minutes/day): _____ Minutes **Typical**
<Total of Lunch & Breaks / Day> M T W H F S SU **EVEN WEEK**
<Check Days Worked, Write Total Hours/Day Below>
16. # of **Distinct** Jobs Rotated to: _____
18. Note Unusual Schedule Here: _____
- _____

19. Jobs Included in Position:

Job #	Line/Cell/ Workstation	Job Title/ Description	PACE Self, Line, Piece Rate	Cycle Time (seconds)	Production per Hour	Typical Work Hrs/Day	Typical Work % of Day <input type="checkbox"/> OR <input type="checkbox"/>
1			S L P				
2			S L P				
3			S L P				
4			S L P				
5			S L P				
6			S L P				
7			S L P				
8			S L P				

Subject ID: _____

Worker Information

20. Prior Work Experience; Back Maximum of 10 Years **OR** Maximum of 5 Jobs¹:
 (Include Current Position and *significantly* different prior positions with *present* employer first)

Position	Title / Description	Years	Average Borg Rating
Current			
Prior #1			
Prior #2			
Prior #3			
Prior #4			
Prior #5			

21. Do you currently work on a second job outside of this facility? Yes No

22. If Yes, 2nd Job Title/Description: _____

23. Average Hours/Week on 2nd Job: _____ 24. Number of Years on 2nd Job: _____

25. Dominant Hand Overall (Average) Borg Rating for 2nd Job: _____

26. Worker's Dominant Hand L R B (if Both, Test Right)

Trial #1	Trial #2	Trial #3	Average
kgf	kgf	kgf	kgf
kgf	kgf	kgf	kgf
kgf	kgf	kgf	kgf
Borg CR-10			

27. Worker's Maximum **Grip** Strength (Dominant Hand, #2 Position)

28. Worker's Maximum **Lateral Pinch** Strength (Dominant Hand)

29. Worker's Maximum **3-Point Pinch** Strength (Dominant Hand)

30. Standardized Grip Force² (10 kgf) (Dominant Hand, Borg CR-10)

Worker Estimated Rating (Stress) (Dominant Hand)	Worker Rating @ Beg/End (Stress) (Dominant Hand)

31. Overall Worker Rating at **Beginning** of Shift³ (Borg CR-10)

32. Overall Worker Rating at **End** of Shift³ (Borg CR-10)

33. Analyst Notes (Optional): _____

Appendix C.2: Job Specific Data Collection Form

Job Specific Data Form

1. Subject I.D. _____ 5. Facility: _____
<From Position Form, Field #1>
2. Analyst Name(s): _____ 6. Time (24hr): _____
<2:30 pm = 14:30, midnight = 00:00>
3. Cycle Time (minutes:seconds): _____ 7. Date: _____
<MM / DD / YYYY>
4. Job ID (Plant Official): _____ 8. Job # (From "Position Data Form, Field #19"): _____

Job Overview

9. Task Borg CR-10 Estimated Ratings (To Assist with Video Analysis)*

Task	Task Description	Average Analyst Borg CR-10 Rating	
		Left (Force)	Right (Force)
1			
2			
3			
4			
5			

* Write down major tasks under "Task Description", assign typical Borg CR-10 ratings for hand(s) involved for each task

Video Observation (Remind worker: "I will focus on your hands & arms.")

Direct Observation (Worker Remains Working.)

10. Average Hand/Arm Vibration Exposure, (Circle Level(s) if Present, Indicate % of Cycle Time for EACH Level)	Left Hand			Right Hand		
	Neg.	Visible	Severe	Neg.	Visible	Severe
	____%	____%	____%	____%	____%	____%

11. Gloves (Indicate Type & Fit for BOTH Hands)	Left Hand		Right Hand	
	<input type="checkbox"/> NONE <input type="checkbox"/> Vinyl <input type="checkbox"/> Latex <input type="checkbox"/> Cotton <input type="checkbox"/> Tipless <input type="checkbox"/> Cut-Resistant <input type="checkbox"/> Anti-Vibration <input type="checkbox"/> Leather <input type="checkbox"/> Other _____	<input type="checkbox"/> Tight <input type="checkbox"/> Normal <input type="checkbox"/> Loose	<input type="checkbox"/> NONE <input type="checkbox"/> Vinyl <input type="checkbox"/> Latex <input type="checkbox"/> Cotton <input type="checkbox"/> Tipless <input type="checkbox"/> Cut Resistant <input type="checkbox"/> Anti-Vibration <input type="checkbox"/> Leather <input type="checkbox"/> Other _____	<input type="checkbox"/> Tight <input type="checkbox"/> Normal <input type="checkbox"/> Loose

12. Room Temperature: _____°C	Left Hand		Right Hand	
		____°C	<input type="checkbox"/> Not Applicable	____°C
13. Hand Contact with Hot/Cold Objects (Indicate Temperature, % of Cycle Time and Use of Gloves for BOTH Hands)	Gloves: <input type="checkbox"/> Yes <input type="checkbox"/> No		Gloves: <input type="checkbox"/> Yes <input type="checkbox"/> No	
	____% of Cycle in Contact		____% of Cycle in Contact	

Job # ____-1

Form #: 12082003

Subject I.D. _____ Job # (From "Personal Data Form, Field #19"): _____

14. Localized Mechanical Compression (Determine Severity on Site):

	Negligible	Left		Negligible	Moderate / Severe	Right	
		Moderate / Severe	Exertions/cycle % of Cycle			Moderate / Severe	Exertions/cycle % of Cycle
a. Palm		M S	Ex/Cycle: _____ % of Cycle: _____		M S	Ex/Cycle: _____ % of Cycle: _____	
b. Wrist		M S	Ex/Cycle: _____ % of Cycle: _____		M S	Ex/Cycle: _____ % of Cycle: _____	
c. Forearm		M S	Ex/Cycle: _____ % of Cycle: _____		M S	Ex/Cycle: _____ % of Cycle: _____	
d. Elbow		M S	Ex/Cycle: _____ % of Cycle: _____		M S	Ex/Cycle: _____ % of Cycle: _____	
e. Finger(s)		M S	Ex/Cycle: _____ % of Cycle: _____		M S	Ex/Cycle: _____ % of Cycle: _____	

Worker Ratings (Final Interaction with Worker for this Job)

15. Hand / Wrist / Forearm / Elbow Force Measures:

Variables	Not Applicable	Typical Overall Exposure		Typical Peak Exposure	
		Left	Right	Left	Right
a. Weight of Workpiece(s) or tool(s) <kg> (supported by worker)		kg	kg	kg	kg
b. Center of Mass Offset, <inches> (Measure from Center of Grip)		in	in	in	in
c. Matching Grip Force ⁴ , <kgf> (Dominant Hand Only)		kgf	kgf	kgf	kgf
d. Matching Pinch Force ⁵ , <kgf> Typical Pinch Type: <input type="checkbox"/> Lateral, <input type="checkbox"/> 2-Point, <input type="checkbox"/> 3-Point		kgf	kgf	kgf	kgf
e. Matching Thrust Force ⁶ , <kgf>		kgf	kgf	kgf	kgf
f. Pushing Force, <kgf> (Analyst Measured)		kgf	kgf	kgf	kgf
g. Pulling Force, <kgf> (Analyst Measured)		kgf	kgf	kgf	kgf
h. Analyst Rating of Applied Force ^{7,*} (Borg CR-10, Entire Job)		CR-10	CR-10	CR-10	CR-10
i. Worker Rating of Applied Force ^{7,*} (Borg CR-10, Entire Job)		CR-10	CR-10	CR-10	CR-10

* Typical Stress Level Across **ALL** Sub-Tasks for **One** Cycle

Job # _____-2

Form #: 12082003



Subject I.D. _____ Job # (From "Personal Data Form, Field #19"): _____

Analysis from Video (Performed outside the plant):

16. Tool Kicks and Hand as Hammer:

	Negligible	Left Number/Cycle @ Each Severity Level		Negligible	Right Number/Cycle @ Each Severity Level	
		Moderate (Visible)	Severe		Moderate (Visible)	Severe
a. Tool Kicks						
b. Hand as Hammer						

17. HAL Rating, Hand/Wrist Posture, Forearm Rotations (All Measurements Taken from Video)	Typical Exposure %				Typical Exposure Counts (Circle Peak Force Posture)							
	Left Hand			Right Hand			Left Hand		Right Hand			
a. HAL Rating												
b. Hand/Wrist Posture (From Anatomical Neutral, Measured in degrees)												
I. Flexion (Totals 100% of Cycle)	Low <30°	Med 30°-50°	Hi >50°	L	M	H	L	M	H	L	M	H
II. Extension (Totals 100% of Cycle)	Low <30°	Med 30°-50°	Hi >50°	L	M	H	L	M	H	L	M	H
III. Ulnar Deviation (Totals 100% of Cycle)	Low <10°	Med 10°-25°	Hi >25°	L	M	H	L	M	H	L	M	H
IV. Radial Deviation (Totals 100% of Cycle)	Low <5°	Hi ≥5°		L	H		L	H		L	H	
c. Number of Forearm Rotations per Cycle (Measure rotations ≥ ±45°, return to neutral is 1 rotation)												

18. Exertions with Elbow Included Angle <70°  or >135° 
(Record exertions / cycle, % of cycle, and typical forearm rotation during exertion):

	Negligible	Left			Negligible	Right		
		<70°	>135°			<70°	>135°	
a. Number of Exertions		____ / Cycle	____ / Cycle			____ / Cycle	____ / Cycle	
b. % of Cycle Time		____ %	____ %			____ %	____ %	
c. Typical Forearm Position (Neutral, Prone, Supine)		N P S <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	N P S <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		N P S <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	N P S <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	N P S <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	

Job # ____-3

Form #: 12082003

Subject I.D. _____ Job # (From "Personal Data Form, Field #19"): _____

19. Grip & Pinch Exertions for a Typical Cycle (Record % of cycle, and Grip or Pinch Span (≈ inches)):

Type of Grasp (Indicate: % of Cycle & Grip or Pinch Span)	Negligible	Left		Negligible	Right	
		% of Cycle	≈ Grip/Pinch Span*		% of Cycle	≈ Grip/Pinch Span*
a. Power/Hook Grip			inches			inches
b. Oblique Grip			inches			inches
c. Palmer Grip			inches			inches
d. Palmer Pinch			inches			inches
e. 3-Point Pinch			inches			inches
f. 2-Point Pinch			inches			inches
g. Lateral (Key) Pinch			inches			inches
h. 2-Finger "Scissor" Pinch			inches			inches

Strain Index Analysis from Video:

* Approximate actual span from video observation; for spans less than ~¼ inch, put 0 for Grip/Pinch Span.

20. Total Cycle Time = _____ Seconds (As Timed at Plant, or From Video)

21. **LEFT** Hand Strain Index Table:

Task	Task Description	Time	Intensity of Exertion (Borg CR-10)	Number of Exertions / Cycle	Hand/Wrist Posture (SI Definition)	Duration of Exertion per Cycle	Speed (SI Definition)	Hours / Day
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Job # _____-4

Form #: 12082003

Subject I.D. _____ Job # (From "Personal Data Form, Field #19"): _____

22. **RIGHT** Hand Strain Index Table:

Task	Task Description	Time	Intensity of Exertion (Borg CR-10)	Number of Exertions / Cycle	Hand/Wrist Posture (SI Definition)	Duration of Exertion per Cycle	Speed (SI Definition)	Hours / Day
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

23. **Comments & Observations (Risk Factors and Concerns not Otherwise Recorded):**

Borg CR-10

0.5	Very, Very Light
1	Very Light
2	Light
3	Moderate
4	Somewhat Hard
5	Hard
6	
7	Very Hard
8	
9	
10	Near Maximal

Grip & Pinch Exertions Job Specific Form

		#19a: Power Grip
	#19a: Hook Grip Thumb is NOT Used	
	#19c: Palmer Grip	
	#19d: Palmer Pinch	
	#19f: 2-Point Pinch	
	#19g: Lateral Pinch	

Grip & Pinch Strength Testing Position Specific Form



#27 Power Grip

Wrist Posture: Functional Neutral

Shoulder Angle: 0°

Elbow Angle: 90°



#28: Lateral Pinch

Wrist Posture: Functional Neutral

Use: Thumb, Side of Index Finger



#29: 3-Point Pinch

Wrist Posture: Functional Neutral

Use: Thumb, Index & Middle Fingers

Appendix C.5: Hand Activity Level (HAL) Scale

HAL Scale

