



University Of Jordan
School Of Engineering
Industrial Engineering Department

HUMAN FACTOR & WORK MEASUREMENT LAB

Experiment #8

Strength evaluation system (Jackson system)

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- **Objectives**

Objectives of strength evaluation experiment using jackson system can be:

- 1) Assessment of physical strength and functional capacity .
- 2) Measure shoulder, arm, and back strength to determine an individual's overall strength levels and identify potential strength imbalances.
- 3) Evaluate physical ability to perform tasks such as lifting, pulling, and carrying.
- 4) Scores may be good indication to fitness level.
- 5) detect areas of variety, this insures putting right person at right place.

• Procedures

1- A person must stand in a neutral posture. Holding the metal bar using facing-up palms. Feet must be shoulder width apart. Elbows at 90 degrees. While adjusting the metal bar to the right height for each student.

2- The purpose of this test is to measure the arm lifting strength of the body. The person is not allowed to lean back or grasp the handle in the ulnar direction.

3- The force is correctly exerted by lifting with the hand palm.

4- The person must grip the handle with full strength for the adjusted time on the Jackson unit load cell (3 sec).

5- The peak and the average values will be shown on the tablet in (kg) for each student in each trial.



Figure 1: right posture during test.

- Readings & Calculations

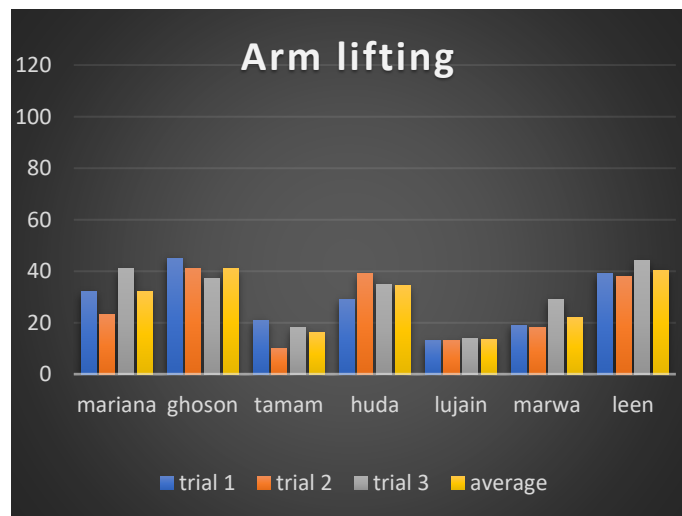
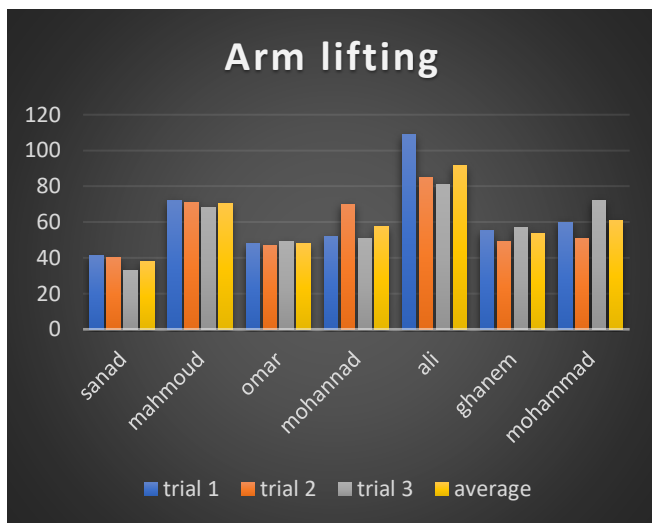
Arm lifting

males	Name	trial 1	trial 2	trial 3	weight(lbs)	average	std
	sanad	41	40	33	160.6	38	4.358899
	mahmoud	72	71	68	149	70.333333	2.081666
	omar	48	47	49	173	48	1
	mohanad	52	70	51	178	57.66667	10.69268
	ali	109	85	81	191	91.66667	15.14376
	ghanem	55	49	57	114.4	53.66667	4.163332
	mohammad	60	51	72	154	61	10.53565
total avg =		60.04762			total std =		17.81145

percentaile
20%
45%
10%
45%
55%
55%
15%

females	Name	trial 1	trial 2	trial 3	weight(lbs)	average	std
	mariana	32	23	41	154	32	9
	ghoson	45	41	37	137	41	4
	tamam	21	10	18	119	16.333333	5.686241
	huda	29	39	35	132	34.333333	5.033223
	lujain	13	13	14	126	13.333333	0.57735
	marwa	19	18	29	134	22	6.082763
	leen	39	38	44	152	40.333333	3.21455
total avg =		28.47619			total std =		11.60439

percentaile
15%
50%
10%
20%
7%
12%
45%



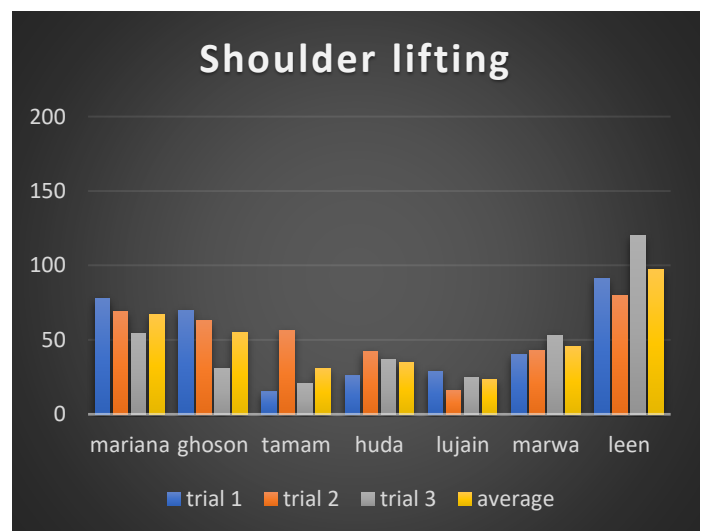
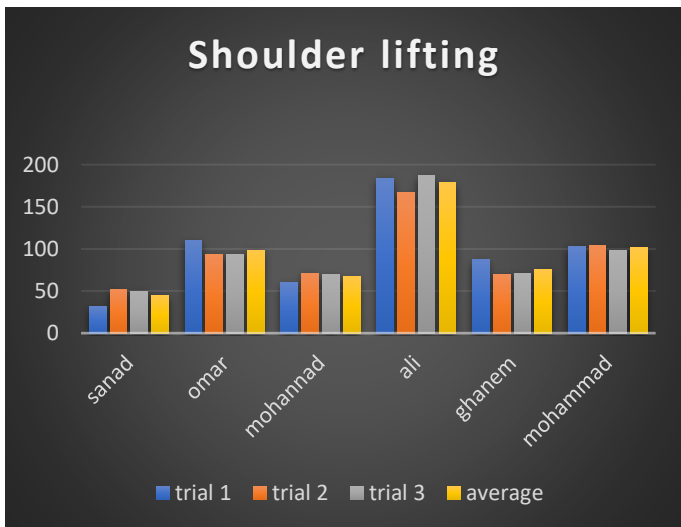
Shoulder lifting

males	Name	trial 1	trial 2	trial 3	weight(lbs)	average	std
	sanad	32	52	50	160.6	44.66667	11.01514
	omar	110	93	93	173	98.66667	9.814955
	mohannad	60	71	70	178	67	6.082763
	ali	184	167	187	191	179.3333	10.78579
	ghanem	87	70	71	114.4	76	9.539392
	mohammad	103	104	98	154	101.6667	3.21455
total avg =		94.55556			total std =		17.81145

percentaile
7%
30%
10%
90%
25%
45%

females	Name	trial 1	trial 2	trial 3	weight(lb)	average	std
	mariana	78	69	54	154	67	12.12436
	ghoson	70	63	31	137	54.66667	20.79263
	tamam	15	56	21	119	30.66667	22.14347
	huda	26	42	37	132	35	8.185353
	lujain	29	16	25	126	23.33333	6.658328
	marwa	40	43	53	134	45.33333	6.806859
	leen	91	80	120	152	97	20.66398
total avg =		50.42857			total std =		27.25724

percentaile
52%
25%
7%
10%
8%
15%
90%



- Conclusion & discussion

$$\text{Mean} = \frac{\sum x_i}{n}$$

$$SD_{\text{sample}} = \sqrt{\frac{\sum (x_i - \bar{x})^2}{N-1}}$$

Weight	Grip			Arm Lift			Shoulder Lift			Torso Pull		
	Low	Avg	Hi	Low	Avg	Hi	Low	Avg	Hi	Low	Avg	Hi
90-99	38	54	71	24	37	50	37	53	69	79	120	162
100-109	40	56	73	25	39	52	39	55	71	83	125	166
110-119	42	58	75	27	40	53	41	57	73	88	129	171
120-129	44	60	77	28	42	55	43	59	75	92	134	176
130-139	46	62	79	30	43	56	45	61	77	97	139	180
140-149	48	64	81	31	45	58	47	63	79	102	143	185
150-159	50	66	83	33	46	59	49	65	81	106	148	189
160-169	52	68	85	34	48	61	51	67	83	111	152	194
170-179	54	70	87	36	49	62	53	69	85	115	157	199
180-189	56	72	89	37	51	64	55	71	87	120	162	203
190-199	58	74	91	39	52	65	57	73	89	125	166	208
200-209	60	76	93	40	54	67	59	75	91	129	171	212

MEN

Weight	Grip			Arm Lift			Shoulder Lift			Torso Pull		
	Low	Avg	Hi	Low	Avg	Hi	Low	Avg	Hi	Low	Avg	Hi
110-119	68	91	113	51	70	98	68	90	112	182	223	264
120-129	71	93	116	54	73	91	72	94	116	186	227	269
130-139	73	96	118	56	75	94	75	98	120	191	232	273
140-149	76	98	121	58	77	96	79	102	124	196	237	278
150-159	78	101	124	61	79	98	83	105	128	201	242	283
160-169	81	104	126	63	82	101	87	109	131	206	247	288
170-179	84	106	129	65	84	103	91	113	135	210	251	293
180-189	86	109	131	68	86	105	91	117	139	215	256	297
190-199	89	111	134	70	89	107	98	121	143	220	261	302
200-209	91	114	137	72	91	110	102	124	147	225	266	307
210-219	94	117	139	74	93	112	106	128	150	230	271	312
220-229	97	119	142	77	96	114	110	132	154	234	275	317
230-239	102	124	147	81	100	119	117	140	162	244	285	326

Conclusion

- In conclusion, the Jackson Strength Evaluation has proven to be a valuable tool in assessing arm lift and shoulder lift, the comprehensive nature of the evaluation, and feature that the test take body mass in regard to indicate the percentile and that has provided valuable insights especially for underweight males like (Mohammad Ghanem) or overweight females like (Mariana)these findings contribute significantly to our understanding of how our strength is can be partially measured, moving forward it is recommended that to make the test with appropriate posture to avoid repeat it and get fatigue and that happened with (Muhannad Tuffaha).
- As an indicator to provide a idea if measurement was right or not you can detect the STD of your reading it must be as minimum as possible and the peak value must be close to AVG of readings.