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Industrial Engineering and Operation Management in Ready-made Garment Industry

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Introduction

- Ready-made garments (RMG) industry
- Industrial Engineering (IE) and Operation Management (OM)
- The concept and functions of IE and OM
- Industrial engineering tools
  - ABC Classification
  - Process mapping
  - Time study
  - Brainstorming or brainwriting

The NYTIL garment facility, Jinja, Uganda

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Aim and Objectives

- Aim
  - To develop an operation bulletin for garment production
- Objectives
  - To analyze the current state of the garment production system
  - To determine the total Standard Minute Value (SMV)
  - To determine the manpower requirement

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Rationale

- Improve decision making at operational production planning
- Improve resource planning
- Motivation of operators

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Methodology

Current state analysis

- ABC classification
- Brainstorming
- Process mapping

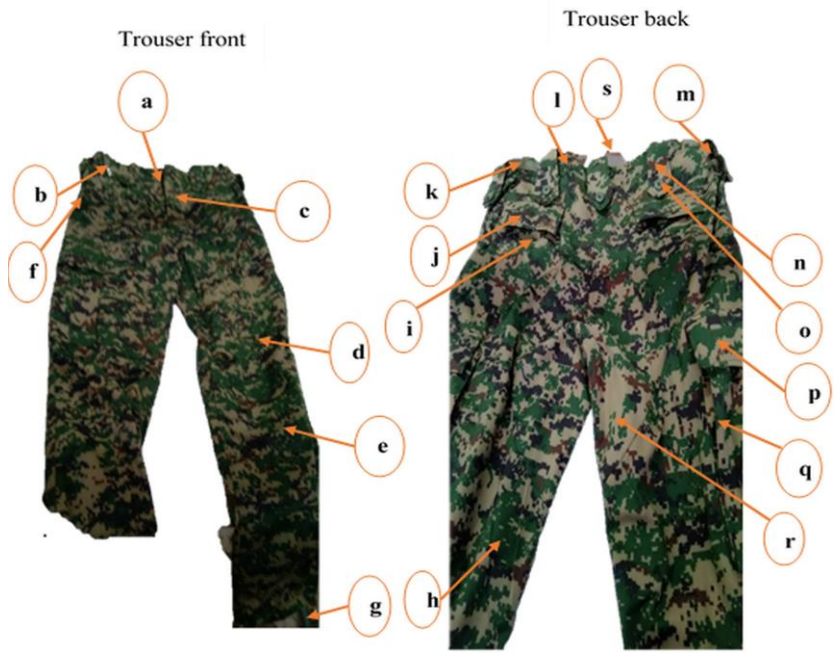
Time Study

- Observation
- Continuous stopwatch

Operation bulletin

Calculations:

- Standard minute value (SMV)
- Line target
- Target for an operation
- Manpower requirement



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Results and Discussion

Operation bulletin for tasks 1-22

OPN	Task description	Resource	OT (min)	SMV	Target	MPC	MPR
1	Buttonhole on flybox	Buttonhole machine	0.309	0.315	1142	0.46	1
2	Front rise overlocks	Overlock machine	0.243	0.283	1270	0.41	1
3	Knee patch attach	Single needle lockstitch	0.885	0.929	388	1.35	2*
4	Side pocket flatlock	Flatlock machine	0.255	0.352	1023	0.51	1
5	Side pocket overlock	Overlock machine	0.154	0.198	1816	0.29	1
6	Right flybox overlock	Overlock machine	0.259	0.334	1078	0.49	1
7	Side pocket attach	Single needle lockstitch	0.550	0.577	624	0.84	1
8	Side pocket topstitches	Single needle lockstitch	0.658	0.691	521	1.01	1
9	Right flybox attach	Single needle lockstitch	0.668	0.701	513	1.02	1
10	Fly attach	Single needle lockstitch	0.663	0.695	518	1.01	1
11	Front prep bundling	Helper	0.448	0.373	965	0.54	1
12	Back marking	Helper	0.227	0.214	1681	0.31	1
13	Back patch pressing	Iron press	1.659	1.356	266	1.98	2
14	Back patch attach	Single needle lockstitch	0.455	0.534	674	0.78	1
15	Hip pocket cutting	Automatic wallet machine	0.170	0.247	1460	0.36	1
16	Hip pocket overlocks	Overlock machine	0.800	0.927	388	1.35	2*
17	Hip flap folding	Helper	0.229	0.216	1666	0.32	1
18	Buttonhole on hip flap	Button hole machine	0.184	0.187	1923	0.27	1
19	Hip flap runstitch	Single needle lockstitch	0.316	0.331	1087	0.48	1
20	Hip flap turning	Turning machine	0.255	0.240	1499	0.35	1
21	Hip flap topstitches	Single needle lockstitch	0.402	0.421	854	0.61	1
22	Hip pocket finish	Single needle lockstitch	0.695	0.730	493	1.06	1

Results and Discussion Cont..

Operation bulletin for tasks 23-45

OPN	Task description	Resource	OT (Mins)	SMV	Target	MPC	MPR
23	Hip flap attach	Single needle lockstitch	0.554	0.582	619	0.85	1
24	Back prep bundling	Helper	0.381	0.359	1001	0.52	1
25	F&B matching	Helper	0.458	0.432	834	0.63	1
26	Side seam overlock	Overlock machine	1.196	1.531	235	2.23	2
27	Side seam topstitches	Feed of arm machine	0.771	1.091	330	1.59	2
28	Knee pocket marking	Helper	0.384	0.362	995	0.53	1
29	Knee pocket folding	Helper	0.249	0.235	1532	0.34	1
30	Knee pocket hemming 1	Single needle lockstitch	1.108	1.163	310	1.70	2
31	Knee pocket tacking	Single needle lockstitch	0.532	0.558	645	0.81	1
32	Knee pocket overlock	Overlock machine	0.204	0.238	1514	0.35	1
33	Knee pocket hemming 2	Single needle lockstitch	1.210	1.270	284	1.85	2
34	Knee pocket ironing	Iron press	1.867	1.652	218	2.41	2
35	Knee pocket attach	Single needle lockstitch	1.192	1.251	288	1.82	2
36	Knee flap folding	Helper	0.427	0.403	894	0.59	1
37	Buttonhole on knee flap	Button hole machine	0.198	0.202	1783	0.29	1
38	Knee flap runstitch	Single needle lockstitch	0.211	0.221	1625	0.32	1
39	Knee flap turning	Turning machine	0.370	0.349	1033	0.51	1
40	Knee flap topstitch	Single needle lockstitch	0.373	0.392	919	0.57	1
41	Knee flap attach	Single needle lockstitch	1.639	1.721	209	2.51	3*
42	Bar tacking	Bartack machine	1.493	1.560	231	2.28	2
43	Back rise overlocks	Overlock machine	0.514	0.658	547	0.96	1
44	Back rise topstitches	Double needle lockstitch	0.408	0.576	625	0.84	1
45	Big loop part matching	Helper	0.081	0.076	4711	0.11	1

Results and Discussion Cont..

Operation bulletin for tasks 46-65

OPN	Task description	Resource	OT (mins)	SMV	Target	MPC	MPR
46	Big loop runstitch	Single needle lockstitch	0.248	0.260	1386	0.38	1
47	Big loop turning	Turning machine	0.160	0.151	2385	0.22	1
48	Big loop topstitches	Single needle lockstitch	0.222	0.233	1545	0.34	1
49	Big loop button hole	Button hole machine	0.093	0.095	3795	0.14	1
50	small loop runstitch	Loop stitch machine	0.141	0.149	2412	0.22	1
51	S&B loop, W.B attach	Single needle lockstitch	1.964	1.819	198	2.65	3
52	Waist band topstitch	Single needle lockstitch	1.076	1.129	319	1.65	2
53	Waist band closing	Single needle lockstitch	1.405	1.474	244	2.15	2
54	Small loop tacking	Single needle lockstitch	1.605	1.685	214	2.46	3*
55	Inseam overlock	Overlock machine	0.473	0.548	657	0.80	1
56	Trouser turning	Helper	0.376	0.355	1015	0.52	1
57	Inseam topstitch	Feed of arm machine	0.483	0.671	536	0.98	1
58	Adjustable prep	Helper	0.151	0.142	2535	0.21	1
59	1st adjustable attach	Single needle lockstitch	1.193	1.252	287	1.83	2
60	Button hole on bottom	Button hole machine	0.513	0.523	689	0.76	1
61	Adjustable hemming	Single needle lockstitch	0.156	0.164	2198	0.24	1
62	2nd adjustable attach	Single needle lockstitch	0.655	0.688	524	1.00	1
63	Bottom Rope attach	Helper	0.937	0.884	407	1.29	2*
64	Bottom hemming	Single needle lockstitch	0.870	0.913	394	1.33	2*
65	Final bar tacking	Bartack machine	0.856	0.895	402	1.31	2*

Results and Discussion Cont..

- Manpower requirement with (*) include; operation 3, 16, 41, 54, 63, 64 and 65.
  - Bottleneck workstations
  - Work in progress and idle time
- Recommended manpower numbers
  - 2 ironing operations = 4 ironers
  - 51 machine operations = 63 operators
  - 12 helper operations = 13 helpers

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Significance of the findings

- Demonstrates IE application in garment production
- Improve the efficiency and effectiveness of resource utilization
- Setting up realistic production target
- Measure production capability

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Conclusions

- Function of IE
- Practical implementation
- Trouser assembly line balancing

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Thank you for Listening

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