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High volume materials distribution and control in the beverage and food industry in the Republic of South Africa

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erage manufacturer's materials handling system.

This cost breakdown does not include actual raw material costs, production costs or marketing costs.

6.2.1. Distribution - External:

		c/case	% of total cost
Vehicles	- running	3,5	12
Vehicles	- depreciation	4,1	14
Vehicles	- maintenance	0,4	1
Labour	- automotive	9,4	31
Labour	- administrative	0,1	-
Overheads	- vehicles	0,6	2
	Sub Total	18,1	60

6.2.2. Distribution - Internal:

Forklifts	- running and maintenance	1,0	3
Forklifts	- depreciation	0,4	1
Forklifts	- labour	0,5	2
Warehouse	- labour	0,3	1
Warehouse	- overheads	1,6	5
	Sub Total	3,8	13

6.2.3. Containers:

Pallets	- depreciation	0,24	1
Pallets	- losses	0,04	-
Cases	- depreciation	1,30	4
Cases	- losses	0,42	1
Bottles	- depreciation	2,90	10
Bottles	- losses	3,20	11
	Sub Total	8,1	27

Total handling cost ± 30c/case.

../88

6.3. DISCUSSION:

By far the highest individual cost is that of labour for the trucks (31% of the total).

This is followed by the Capital depreciation and the running costs of these vehicles.

6.3.1. Labour:

Normally the labour on each truck consists of a Driver/Administrator and three helpers.

Salary levels of such workers have risen tremendously in this field over the past few years. It is however, unlikely that this area will continue to be the only major cost item in the future as petrol and material prices are growing at an even more rapid rate.

6.3.2. Capital Depreciation:

Today a typical route truck costs ± R35 000. The replacement cost of a fleet of 200 vehicles would thus be in excess of R7 million.

6.3.3. Running Costs:

The main item here is fuel costs. The only real method of reducing fuel costs at this stage is to re-

../89

duce distances travelled. However, care can also be taken to tune the vehicles and to use the right sized and geared trucks (horses) for the job.

6.4. SAVINGS:

By implementing the findings and recommendations in this direction the following costs can be saved:

Cost Area	Due To	Reference Chapter	Savings Expected	C/Case	Thousands of Rands for 20 Million Case Sales
Vehicle depreciation	Fewer vehicles	4 and 5	± 26%	1,07	213
Vehicle maintenance	Fewer vehicles	4 and 5	± 20%	0,08	16
Labour automotive	Fewer vehicles) Better staffing)	5	26%) 20%)	4,32	865
Labour admin.	More admin.	5 and 6	- 50%	0,05	- 10
Overhead vehicles	Fewer vehicles	4 and 5	20%	0,12	24
Forklifts	Using trolleys	4	19%	0,27	53
Overheads (warehouse)	Customer sizes) Pallet sizes)	4 app. 3	15%	0,24	48
Bottle losses	Better sorting	4	15%	0,48	96
Total Savings					1305,00

6.5. CONCLUSION:

Savings in excess of 1 million rands per annum may be expected.

../90

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../90

CHAPTER 7

FUTURE TRENDS

7.1. Larger Containers:

Perhaps one of the most interesting recent developments in the beer and soft drink market is the increase in container sizes.

Today ± 40% of all soft drinks (by volume) produced in U.S.A. are distributed in 2 litre bottles (ref. 4). In South Africa the 1 litre bottle has completely dominated the market over the past few years, and in the wine industry, the 2 litre bottle now completely outsells all other products. It seems that this tendency is likely to continue and the 1 litre beer container and 1,5 to 2 litre soft drink bottle cannot be too far away.

From a distribution point of view this development is likely to effect handling methods rather than actual routing of the vehicles, and also make it even more important to look after an even more expensive bottle. Containers are likely to be heavier and thus produce a greater tendency towards mechanical handling.

Fig: 7.1.1. shows the growth of the Container Size this century in the soft drink industry.

../91

FIG: 7.1.1.



GROWTH OF THE SOFT DRINK BOTTLE

FIG: 7.1.2.



VARIOUS SIZES OF BOTTLES

7.2. BULK HANDLING:

With the increased demand by large supermarkets, hypermarkets and chain stores, bulk deliveries are becoming more prevalent.

Chapter 5.13. discusses some of the latest trends in bulk mechanical handling concentrating on the layered pallet (see Fig: 5.13.1.) and the Omega system (see Fig: 5.13.2.). However with the small amount of cases delivered with each drop this type of system is unlikely to be very successful in the near future. Furthermore in the Johannesburg area in South Africa only 6 outlets are at present geared to bulk handling - thus making the gearing of an entire fleet of trucks impractical.

7.3. PRODUCT DISPENSERS:

With ever increasing prices of containers a logical development is to product dispensers. At present such dispensers are used in most bars for draught beers and in restaurants for soft drink products.

Future developments might extend these despensers in the form of coin operated machines in public places and even home operated machines.

7.4. HOUSE - TO - HOUSE SALES:

At first glance the house-to-house sales distribution -

../92

at present most prevalent in the milk industry - seems to be receding. With the development of fortified, longer lasting milks in U.S.A. daily house-to-house sales are becoming fewer and fewer, and a weekly visit by the milkman more common.

However labour is becoming more and more available and it is essentially labour that is needed for house-to-house sales (not raw materials) and the author feels that the house-to-house sales market in the milk and even the beverage industry is by no means dead.

7.5. PROFESSIONAL DISTRIBUTORS:

In many countries (Germany, Holland, etc.) a recent development has been the professional distributor. Here the distributor contracts out to the beverage market to distribute his product - perhaps coupling this to distribution of all sorts of other products e.g. vinegar, milk, minerals, wines, beers, bread, canned foods etc.

The advantage of such a system is that such a distributor, by cutting down on the distance travelled by various trucks from each manufacturing company, can reduce costs greatly.

../93

7.6. CENTRALISED DEPOTS SERVICED BY ELECTRIC VEHICLES:

If the recommendations of the Driessen Reports (ref 8 and 9) are implemented it is going to mean severe restrictions on the movement of trucks.

As South African city centres are very sparsely populated at night time, and shops therefore close, it is very difficult to service thes outlets after working hours.

A solution to this problem is to set up a series of depots in the central city areas, and service the outlets from these depots. Ideally very small vehicles (± 4 pallet vehicles) can supply these outlets.

For such deliveries where short distances are involved, electric vehicles are likely to become far more popular.

../94

CHAPTER 8

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../95

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../96

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../97

APPENDIX 1

STATISTICAL ANALYSIS OF TIME STUDIES AND SELF RECORDING SHEETS.

A total of 2000 points were considered when analysing the self-recording sheets (see Fig: 1.1.) and a further 153 points analysed from the time study sheets (see Fig: 1.2.) using 3 helpers plus a driver as a basis.

The detailed analysis of the time study sheets is shown as an example in this chapter.

The following method was used:

Fig: 1.3. shows a completed activity sampling sheet.

From the 153 self-recording sheets as shown, Fig: 1.4. was obtained.

Data sheets Fig: 1.5. show the set of data obtained from the 153 time study sheets.

A linear regression curve was then fitted to the data in Fig: 1.5. (see Fig: 1.6.).

A curve describing 2 standard deviations from the mean was then fitted to the same data.

This curve should describe the control limits for the mean linear regression curve (see Fig: 1.7.).

../98

By using the 2000 points from the self-recording sheets a further linear regression curve ($y = 0,25\ x + 69$) $r^2 = 0,91$ was also drawn up (see Fig: 5.3.2. chapter 5).

../99

FIG: 1.1.

Driver : .... Date : .... No. of Truck Helpers ..

DRIVER'S SELF RECORDING SHEET

Time Arrived	Time Left	Cases Dropped/Picked Up			Name of Store	Town	Speedo Reading
		Ret. Fulls	N/R Fulls	Empty			

FIG. 1.2

ACTIVITY SAMPLING SHEET

D	1	2	3	4	D	1	2	3	4	D	1	2	3	4

GENERAL INFORMATION

	START	STOP	DURATION
SPEEDO			
TIME			

NAME OF STORE

N/R FULLS	RET. FULLS	RET. EMPTY

CODES

C = UNLOAD FROM VEHICLE
D = FULLS INTO STORE
G = EMPTIES FROM STORE
H = EMPTIES ONTO VEHICLE
L = SORT EMPTIES
O = PARK
P = INSTRUCTIONS
Q = ARRANGE VEHICLE
E = IDLE
IE = ENFORCED IDLE
A = PAPERWORK AND PROCEDURE (DRIVER ONLY)

ACTIVITY SAMPLING SHEET

D	1	2	3	4	D	1	2	3	4	D	1	2	3	4
[illegible]	E	E	E		E	E	[illegible]	[illegible]						
[illegible]	E	E	E		E	[illegible]	[illegible]	[illegible]						
P	C	C	E		[illegible]	[illegible]	G	E						
A	C	C	E		L	H	H	H						
A	C	C	E		L	Q	H	Q						
A	C	D	D		H	Q	H	Q						
[illegible]	C	D	D		H	Q	H	Q						
A	C	D	D		H	Q	[illegible]	Q						
A	E	[illegible]	L		IE	IE	Q	Q						
A	E	L	L							½ min est block				
A	C	L	L							½ min Tot				
[illegible]	C	L	L											
[illegible]	[illegible]	L	L								½	C = ½		
[illegible]	C	[illegible]	[illegible]								½	D = [illegible]		
[illegible]	C	L	L								½	G = [illegible]		
A	C	G	E								½	[illegible]		
[illegible]	C	G	L								½	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]								[illegible]	[illegible]		
A	C	D	L								½	P = [illegible]		
[illegible]	C	D	L									Q = 8		
[illegible]	[illegible]	[illegible]	[illegible]								½	E = 10		
A	C	[illegible]	G								½	[illegible] = 6		
A	[illegible]	[illegible]	D								½	[illegible] = 15		
A	C	D	D											
E	E	G	G											
E	[illegible]	[illegible]	[illegible]											
E	[illegible]	G	[illegible]											

GENERAL INFORMATION

	START	STOP	DURATION
SPEEDO	77321		
TIME	9-35	10-03	28 min

NAME OF STORE

[illegible]

N/R FULLS	RET. FULLS	RET. EMPTY
—	27	23

CODES

C = UNLOAD FROM VEHICLE
D = FULLS INTO STORE
G = EMPTIES FROM STORE
H = EMPTIES ONTO VEHICLE
L = SORT EMPTIES
O = PARK
P = INSTRUCTIONS
Q = ARRANGE VEHICLE
E = IDLE
IE = ENFORCED IDLE
A = PAPERWORK AND PROCEDURE (DRIVER ONLY)

FIG. 1.3

FIG: 1.4.

Time study breakdowns as a percentage of total time spent at each outlet.

	Nigel	Durban
Unloading	14	9
Fulls to store	15	14
Empties from store	12	12
Empties onto vehicle	9	7
Sorting empties	12	14
Giving instructions	2	0
Arranging truck	14	8
Idle	14	14
Admin.	8	20
Parking	0	2

Three men plus driver

FIG. 1.5

x	y	ŷ Line	variance
5	8	7.5	0.5
5	6	7.5	1.5
5	7	7.5	0.5
5	3	7.5	4.5
5	5	7.5	2.5
6	7	7.7	0.7
6	5	7.7	2.7
6	5	7.7	2.7
6	8	7.7	0.3
7	5	7.9	2.9
8	6	8.1	2.1
8	11	8.1	2.9
8	8	8.1	0.1
8	12	8.1	3.9
8	10	8.1	1.9
9	7	8.3	1.3
9	11	8.3	2.7
9	8	8.3	0.3
10	8	8.5	0.5
10	9	8.5	0.5
10	11	8.5	2.5
10	7	8.5	1.5
10	13	8.5	4.5
10	6	8.5	2.5
10	7	8.5	1.5
10	8	8.5	0.5
10	4	8.5	4.5
10	9	8.5	0.5

x	ŷ	y	variance
10	10	8.5	1.5
10	7	8.5	1.5
10	9	8.5	0.5
10	8	8.5	0.5
11	12	8.7	2.3
11	8	8.7	0.3
11	9	8.7	0.3
12	8	8.9	0.9
12	10	8.9	1.1
12	11	8.9	2.1
12	7	8.9	1.9
12	10	8.9	1.1
12	10	8.9	1.1
12	8	8.9	0.9
15	9	9.5	0.5
15	9	9.5	0.5
15	12	9.5	2.5
15	8	9.5	1.5
15	10	9.5	0.5
15	7	9.5	2.5
15	11	9.5	1.5
15	10	9.5	0.5
15	12	9.5	2.5
15	9	9.5	0.5
15	7	9.5	2.5
16	8	9.7	1.7
16	11	9.7	1.3
16	10	9.7	0.3

x	y	ŷ Line	variance
16	11	9.7	1.3
16	9	9.7	0.7
16	10	9.7	0.59
17	11	9.9	1.1
18	10	10.1	0.1
18	9	10.1	1.1
18	11	10.1	0.4
19	9	10.1	1.1
19	10	10.3	0.3
20	11	10.5	0.5
20	8	10.5	2.5
20	10	10.5	0.5
20	11	10.5	0.5
20	9	10.5	1.5
20	12	10.5	1.5
20	11	10.5	0.5
21	13	10.7	2.3
21	10	10.7	0.7
22	5	10.9	1.9
22	10	10.9	0.9
22	13	10.9	2.1
22	11	10.9	0.1
24	10	11.3	1.3
24	12	11.3	0.7
24	13	11.3	1.7
24	18	11.3	6.7
24	13	11.3	1.7
25	12	11.5	0.5

x	y	ŷ	variance
25	18	11.5	6.5
25	12	11.7	0.3
26	10	11.7	1.7
26	13	11.7	1.3
26	12	11.7	0.3
26	11	11.7	0.7
26	12	11.7	0.3
26	14	11.7	2.3
26	13	11.7	1.3
28	13	12.1	0.9
29	12	12.3	0.3
29	11	12.3	1.3
30	14	12.5	1.5
30	13	12.5	0.5
30	14	12.5	1.5
31	17	12.7	4.3
32	13	12.9	0.1
32	11	12.9	1.9
32	13	12.9	0.1
33	14	13.1	0.9
35	14	13.5	0.5
35	16	13.5	2.5
35	13	13.5	0.5
36	15	13.7	1.3
36	18	13.7	4.3
37	15	13.9	1.1
38	16	14.1	1.9
38	14	14.1	0.1

x	y	ŷ Line	variance
38	17	14.1	2.9
39	15	14.3	0.7
40	16	14.5	1.5
41	14	14.7	0.7
41	13	14.7	0.3
41	18	[illegible]	3.3
42	16	14.9	1.1
42	18	14.9	3.1
43	17	15.5	1.5
45	16	15.5	0.5
48	19	16.1	2.9
50	17	16.5	0.5
50	18	16.5	1.5
50	16	16.5	0.5
51	22	16.7	5.3
54	18	17.3	0.7
57	20	17.9	2.1
57	19	17.9	1.1
61	21	18.7	1.3
61	34	18.7	15.3
64	20	19.3	0.7
64	20	19.3	0.7
69	21	20.3	0.7
69	24	20.3	3.7
71	21	21.1	0.1
72	23	21.9	1.1
84	24	23.3	0.7
85	21	23.5	2.5

x	y	ŷ	variance
97	30	25.9	4.1
99	30	26.3	3.7
114	31	29.3	1.7
116	36	29.7	6.3
121	32	30.7	1.3
121	37	30.7	6.3
127	34	31.9	2.1
146	39	35.7	3.3
156	41	37.7	3.3
162	40	42.9	2.9
194	45	45.3	0.3
202	55	46.7	8.1
210	50	48.5	1.5

FIG: 1.6.

Linear regression curve fit.

Equation $y = ax + b$ $\quad i = 1 \ldots\ldots n$ (for all summations)

$$a = \frac{\sum xy - (\sum x \sum y)/n}{\sum x^2 - (\sum x)^2/n}$$

$$b = \frac{\sum y}{n} - \frac{a \sum x}{n}$$

Coefficient of determination (r^2)

$$r^2 = \frac{\left[\sum xy - (\sum x \sum y)/n\right]^2}{\left[\sum x^2 - (\sum x)^2/n\right]\left[\sum y^2 - (\sum y)^2/n\right]}$$

In this case $n = 153$

$y = ax + b$ $\quad a = 0,2$ $\quad b = 6,5$

$y = 0,2x + 6,5$

$r^2 = 0,94$

FIG: 1.7.

STANDARD DEVIATION (s)

Mean standard deviation = standard deviation of whole sample $s = 1,84$

Mean deviation of whole sample $m = 1,73$

Standard deviation between

5 - 10 case drops	$s = 1,78$
11 - 20 case drops	$s = 0,74$
21 - 30 case drops	$s = 1,59$
31 - 40 case drops	$s = 1,37$
41 - 70 case drops	$s = 3,27$
71 - 120 case drops	$s = 2,26$

By adding these deviation to the best fit linear regression line ($y = 0,2x + 6,5$) the following data is obtained.

	x	y linear reg.	2 standard deviations plus y linear regression.
5 - 10 case drops	7,5	8,0	11,6
11 - 20 case drops	16	9,7	11,2
21 - 30 case drops	26	11,7	14,9
31 - 40 case drops	36	13,7	16,4
41 - 70 case drops	56	17,7	24,2
71 - 120 case drops	96	25,7	30,2

../ (ii)

FIG: 1.7.

Again a linear regression curve can be fitted to the two standard deviations

x	y
7,5	11,6
16	11,2
26	14,9
36	16,4
56	24,2
96	30,2

Solution $y = 0,23x + 8,98$

$r^2 = 0,97$

This curve will then describe the upper control limit at an average of two standard deviations from the mean curve

$y = 0,2x + 6,5$

A similar curve can also be found for a lower control limit equidistant from the upper control limit and the mean curve.

Fig: 5.6.1. shows the resultant calculated curve.

APPENDIX 2

THE DAILY OPERATIONAL RETURN - SETTING UP THE SYSTEM IN A BEVERAGE BOTTLING PLANT AND AN EXAMPLE ANALYSIS.

2.1. SETTING UP THE D.O.R.

The first step in setting up of a D.O.R is to make sure all stocks of raw materials, empty glass and finished product are stored in a neat orderly fashion that will facilitate counting and continuous stock taking.

The next step is to purchase the following:

(a) A board that can be placed next to the bottle filler. This board should be mounted on some sort of stand within easy reach of the filler operator. The idea is that a graph of the daily activities of the filler can then be kept by the filler operator on this board.

Sheet 2.1. shows a typical example of the type of sheet that should be stuck to this board.

The board may be of a blackboard type or a peg-board or be made such that the graph of the operation of the filler can be removed at the end of the day.

../100

SIGNATURE OF LINE FOREMAN:..... PRODUCTION REPORT DATE: SHEET 2.1.

LINE NO.

Please put any remarks on other side of sheet

TIME	0	1	2	3	4	5	6	7	8	9	10
LINE WORKING											
LINE STOPPED											
REASON STOPPED											
FLAVOUR AND SIZE											

STOPPAGE CODE

A: NO EMPTIES	D: BLENDER/MIXER	G: CROWNER/SEALER	J: STANDARD ALLOWANCE
B: WASHER	E: CARBONATOR	H: FLAVOUR CHANGE	K: FULLS NOT BEING REMOVED
C: CONVEYOR	F: FILLER	I: SANITISATION	L:

LABOUR

TOTAL NO. OF WORKERS ON LINE	

CASES PRODUCED

FLAVOUR AND SIZE						
METER READINGS AT START OF PRODUCTION	EMPTIES					
	FULLS					
METER READINGS AT CLOSE OF PRODUCTION	EMPTIES					
	FULLS					
NO. OF CASES TO STORES						

OPENING STOCK

FLAVOUR AND SIZE	NO. CASES

SIGNATURE STOREMAN:

BREAKAGES AND TESTS

EX TRADE	
WASHER	
RETURNED TO INVENTORY (EMPTY)	
OTHER	
FILLER	
RETURNED TO INVENTORY (FULL)	
OTHER	
PRODUCTION TESTS	

SYRUP AND CROWN INVENTORY

FLAVOUR AND SIZE					
O/STOCK - SYRUP					
CONC. DRAWN					
C/STOCK - SYRUP					
O/S CROWNS					
CROWNS DRAWN					
C/STOCK CROWNS					

A further alternative is to dispose of the board altogether and use a scintillagraph.

(b) The next items that need to be purchased are 3-5 empty drums. These will be used to weigh the broken glass at various strategic points in the factory. It is also a good idea to purchase some sort of trolley that can be used for moving the drums.

(c) 3-4 Clip-boards will also be needed for carrying the various D.O.R. sheets.

(d) It is also recommended that an electronic calculator, slide rule or abacus be purchased to facilitate the calculations required.

(e) It is necessary to have a bottle counter on the discharge of the production line. It is also very helpful to have a second bottle counter before the washer (e.g. at de-capper).

(f) A pad of graph paper will be needed.

(g) A clock-card system for the production personnel is also very useful for assessing the number of persons who are working each day and the time spent by each person.

Now that all the required equipment has been collected one can begin installing the D.O.R. system.

../101

2.2 INSTALLING THE D.O.R. SYSTEM

2.2.1. The first step is to do a stock count of crowns, syrup, sugar, CO^2, caustic and B - Oil/coal.

2.2.2. One can now start filling in the D.O.R. sheets.

2.2.3. Sheet 1 is then set up and filled in as the day progresses.

Breakages and tests can be obtained from the drums provided (in Kg. mass which can be converted to number of bottles).

The mass of the bottles can be converted to cases of bottles from the following data:

200 ml bottle .... 0,3977 Kg/Bottle
300 ml bottle .... 0,4356 Kg/Bottle
1000 ml bottle .... 0,9091 Kg/Bottle

The total number of workers on the line can be obtained from the clock cards

The number of cases to stores should be countersigned by the Stores Foreman.

If there is a continuous issue to stores this problem can be overcome by giving the forklift driver a clipboard and sheet of paper on which he can record his deliveries to the stores.

../102

SIGNATURE OF LINE FOREMAN: Joe Bloggs

PRODUCTION REPORT

SHEET 1 A

DATE: 1/4/1984

LINE NO: 1

Please put any remarks on other side of sheet

TIME	7	8	9	10	11	12	13	14	15	16
LINE WORKING										
LINE STOPPED										
REASON STOPPED		I	G	G	F F	J I I I L L			9 A	I I
FLAVOUR AND SIZE		Coke - L								
	0	1	2	3	4	5	6	7	8	9 10

STOPPAGE CODE

A: NO EMPTIES	D: BLENDER/MIXER	G: CROWNER/SEALER	J: STANDARD ALLOWANCE
B: WASHER	E: CARBONATOR	H: FLAVOUR CHANGE	K: FULLS NOT BEING REMOVED
C: CONVEYOR	F: FILLER	I: SANITISATION	L: Filler operator disappears

LABOUR

TOTAL NO. OF WORKERS ON LINE	15

CASES PRODUCED

FLAVOUR AND SIZE						
METER READINGS AT START OF PRODUCTION	EMPTIES	000000				
	FULLS	00000				
METER READINGS AT CLOSE OF PRODUCTION	EMPTIES	33750				
	FULLS	33000				
NO. OF CASES TO STORES		3166				

OPENING STOCK

FLAVOUR AND SIZE	NO. CASES
N/A	—

SIGNATURE STOREMAN: Peter Bloggs

BREAKAGES AND TESTS

EX TRADE	42 KG
WASHER	—
RETURNED TO INVENTORY (EMPTY)	
OTHER	
FILLER	20 KG
RETURNED TO INVENTORY (FULL)	24 bottles
OTHER	
PRODUCTION TESTS	

SYRUP AND CROWN INVENTORY

FLAVOUR AND SIZE	Coke L
O/STOCK - SYRUP	20 units
CONC. DRAWN	0
C/STOCK - SYRUP	0
O/S CROWNS	0
CROWNS DRAWN	8 box
C/STOCK CROWNS	½ box

2.3. Sheet 1A is a typical completed version of the production report.

Here the line began working at 8 a.m. and work was finished by 3.30 p.m. (or 15.30 hours).

It should be noted that time is expressed as a fraction on the D.O.R. sheet e.g. 1 hour 30 minutes = 1.5 hours or 5 minutes = 5/60 = 0,083 hours.

The stoppage between 12 a.m. and 1 p.m. (13.00 hours) is for lunch and cannot be counted as part of the time utilisation.

The bottle filling machine used for this example has a manufacturers rated capacity of 12 000 b/h or 200 b/m.

2.4. THE MAIN D.O.R. SHEET

2.4.1. Now we have completed sheet 1, i.e. sheet 1A, we can begin transferring the information across to the D.O.R. sheet - sheet 2.

2.4.2. It should ne noted that sheet 1 is merely a rough sheet while sheet 2 will be filled out neatly and kept for record purposes.

2.4.3. One can start filling in the D.O.R. sheet in the top left hand corner, i.e. flavour, size, time start and time finish.

../103

Author Bailey M
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