Chapter 4

4.1 Introduction:

This chapter explains the implementation of 0.5 ml bottles project by using DMAIC tools .The project start with define phase and end up with control phase.

As a result of this project we found the DMAIC tools effect on 0.5 ml bottles line which reduce the waste from 0.5% average per week to 0.3% average per week .

4.1.1 500 ml bottles waste reduction project

Green Belt : Khalid Osman
Date project started : February 2015

Project Team

Champion : AMEIN OSMAN

Black Belt : Ibrahim Mohamed

Green Belt : Khalid Osman

Team Members : Mohammed Awad

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Project & Business Synergy

Customer of the Project :

Customer CTQs for the Project :

Table 4.1 VOICE OF CUSTOMER

VOICE OF CUSTOMER							
No	Customer	Voice of Customer	What customer meant				
			What is the need ?	When is the need felt ?	Where is the need felt ?	Why is the need felt ?	How is the situation handle now ?
1	production	High waste of 500 ml bottles	To reduce the waste and increase the quality	Started from jan 2014	Production line	To increase the production line efficiency and decrease the waste	Daily output target

Arriving at the Project CTQ waste of bottles /product

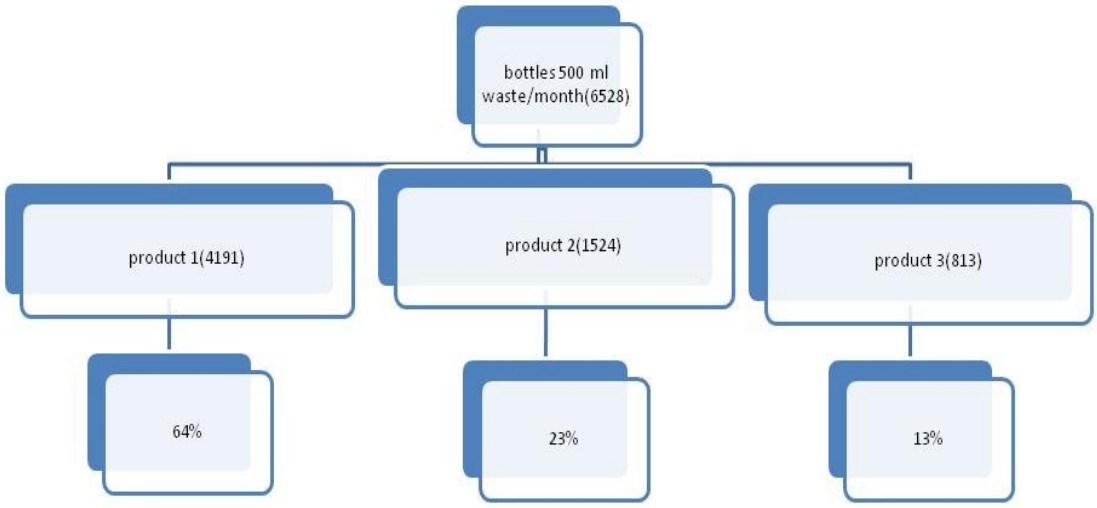

Fig 4.1 Arriving at the Project CTQ waste of bottles /product

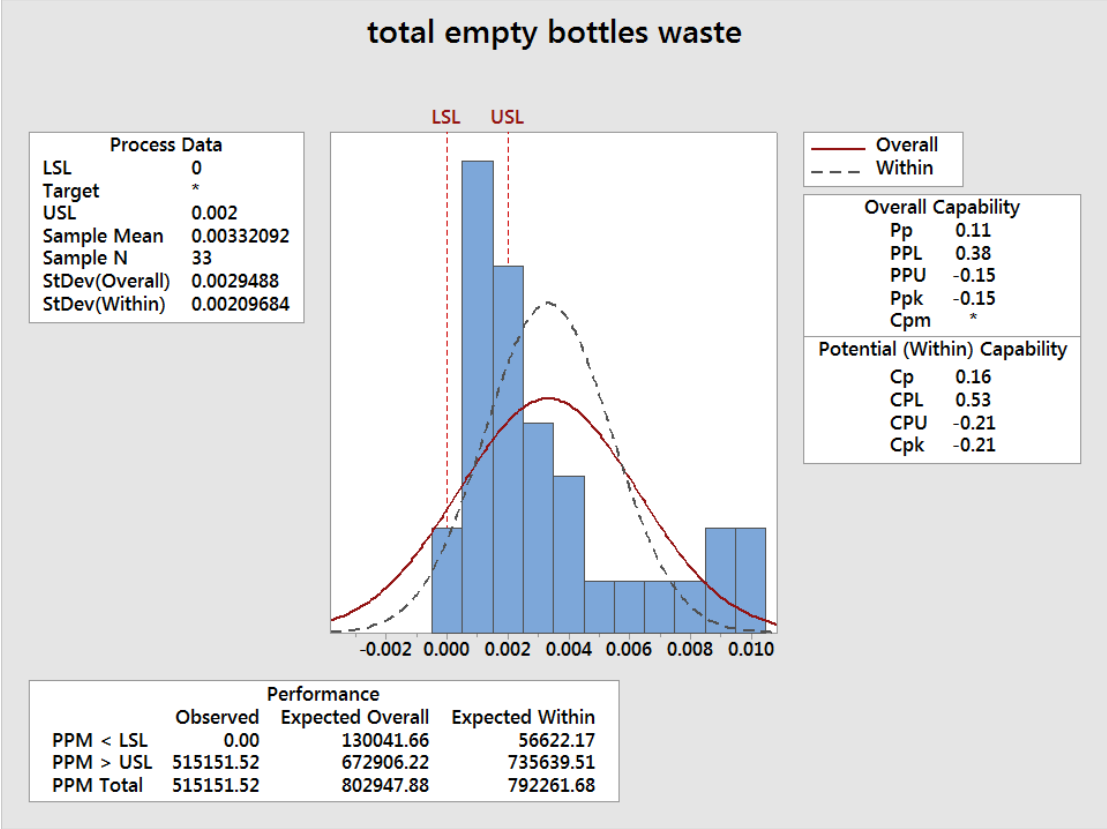

Fig 4.2 total empty bottles waste

Table 4.2 Arriving at the Internal CTQ

Defining a Project

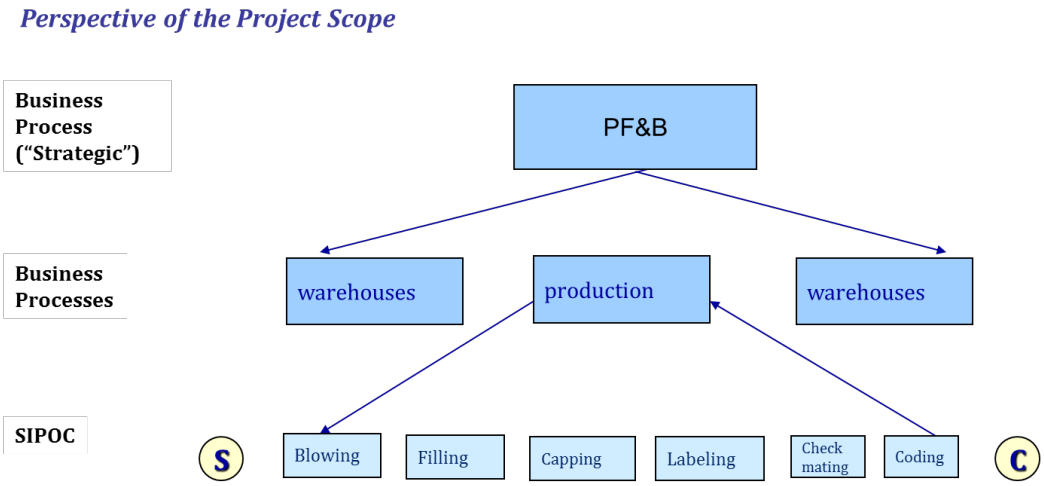

Fig 4.3 perspective of the project scope

SIPOC

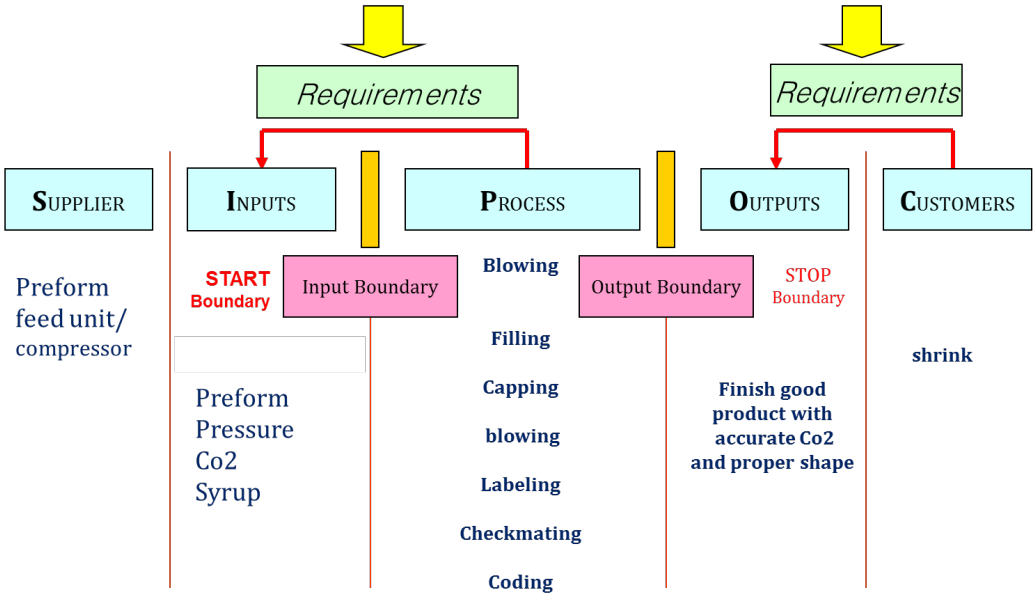

Fig 4.4 Supplier inputs process outputs customers (SIPOC)

Table 4.3 Project Plan of 0.5 ml bottles waste

STEPS	STATUS	PROJECT DURATIONS						REMARKS
		JAN'12	FEB'12	MAR'12	APR'12	MAY'12	JUNE'12	
DEFINE	Plan							
	Actual							
MEASURE	Plan							
	Actual							
ANALYSE	Plan							
	Actual							
IMPROVE	Plan							
	Actual							
CONTROL	Plan							
	Actual							
PROJECT CLOSURE								

Table 4.4 Operational Definition of Y(s)

4.1.1.1 Design of Measurement System of measure phase:

Unit(s) of Measurement : Ys

Unit for measurement is PCS

Target, Specifications / Defect Definition

Waste of bottles/PCS

Fig 4.5 As-is Micro-Level Process Map

Fig 4.6 As-is Detail-Level Process Map

Table 4.5 Cause and Effect Matrix of measure phase

Cause & Effect Matrix									
				1	2	3	4	5	
Customer				moulded bottle	filled bottle with good quality	capped bottle	labeled bottle	assure quality	Total
Requirement									
Priority Rating				1	5	1	1	1	
	Process Step	Process Input			0	0	0	0	
1	moulding	pressure		1	0	0	0	0	1
2		strectching		1	0	0	0	0	1
3		bottle cooling		1	0	0	0	0	1
4		mould locking		1	0	0	0	0	1
5		discharge sensors		0	0	0	0	0	0
6	transfer conveyor	conveyor clamps		0	0	0	0	0	0
7		base cooling		0	1	0	0	0	5
8	infeed bottles to filling machine	filler infeed clamps		0	1	0	0	0	5
9	filler	syrup level		0	3	0	0	0	15
10		DIAPHRAM		0	9	0	0	0	45
11		spreaders		0	6	0	0	0	30
12		vent tubes		0	1	0	0	0	5
13		syrup sensor		0	3	0	0	0	15
14		valve		0	6	0	0	0	30
15		temperature		0	3	0	0	0	15
16		snifits		0	1	0	0	0	5
17	filler discharge star weel	clamps		0	1	0	0	0	5
18	capper feeder	cap storage		0	0	0	0	0	0
19		cap belt V		0	0	3	0	0	3
20		cap belt H		0	0	1	0	0	1
21		DISK BLOCK		0	0	1	0	0	1
22		sensors		0	0	3	0	0	3
23	closing unit	closure		0	0	3	0	0	3
24		tourque setting		0	0	6	0	0	6
25	labeler	vacum		0	0	0	6	0	6

26		glue		0	0	0	6	0	6
27		cutter		0	0	0	6	0	6
28		cutting sensor		0	0	0	6	0	6
29	check mat	parameter setting		0	0	0	0	1	1
33		sensors		0	0	0	0	1	1

Table 4.6 Data Collection Plan of measure phase

Column1	Column2	Column3	Column4	Column5	Column6	Column7
What to measure	defect definition	type of measure	type of data	data collection form	sampling plan	data collected from
Production	company lost due to bad Production	Input/Process	discrete	Production report	unit/ every 10 min	cheick mat
waste	line lost due to over waste	Input/Process	discrete	Production report	unit/ every 10 min	cheick mat
filler syrup level	machine stops due to leaking	Input/process	discrete	Production report	unit/ every 10 min	filler
Temperature Setting	machine stops due to bad temperatur setting	Input/process	discrete	Machine display screen	unit/ every 10 min	filler

pressure setting	**machine stops due to bad pressure setting**	**Input/process**	**discrete**	**Machine display screen**	**unit/ every 10 min**	**filler**

Fig 4.7 product 1 Measurement System Analysis

Fig 4.8 product 2 Measurement System Analysis

Fig 4.9 product 3 Measurement System Analysis

Table 4.7 Target Setting Defect per million (DPM)

Operation	Opportunities	Defects	Units	DPU	TOP	DPO	PPM
1	15	3355	1722072	0.001948	25831080	0.00013	129.8823
2	15	1150	2043816	0.000563	30657240	3.75E-05	37.51153
3	15	3180	2493912	0.001275	37408680	8.5E-05	85.00701
4	15	3014	2459448	0.001225	36891720	8.17E-05	81.69855
5	15	2727	2871360	0.00095	43070400	6.33E-05	63.31494
6	15	6454	2459496	0.002624	36892440	0.000175	174.941
7	15	1708	1000848	0.001707	15012720	0.000114	113.7702
8	15	11660	2467776	0.004725	37016640	0.000315	314.9935
9	15	13004	3080616	0.004221	46209240	0.000281	281.4156
10	15	20742	2040432	0.010165	30606480	0.000678	677.6996
11	15	11340	2453208	0.004623	36798120	0.000308	308.1679
12	15	5193	1900008	0.002733	28500120	0.000182	182.2098
13	15	3853	3130680	0.001231	46960200	8.2E-05	82.0482

14	15	6807	2471136	0.002755	37067040	0.000184	183.6402
15	15	6882	4092456	0.001682	61386840	0.000112	112.1087

Fig 4.10 Cause Analysis of all defects causes

Table 4.8 Potential of Vital Causes

IN OUR CONTROL	high	medium	low
	DAIPHRAM	Rubber seal	pressure
	spreaders	vacuum	strectching
	valve	glue	bottle cooling
	syrup level	cutter	mould locking
	syrup sensor	cutting sensor	cap belt H
	temperature	base cooling	DISK BLOCK
		filler infeed clamps	parameter setting
		vent tubes	sensors
		snifits	
		clamps	

Fig 4.11 five whys of all defects possible sources

Table 4.9 Action Plan of control phase

NO	PROBLEM	IMPROVEMENT PLAN	PRIORITY	WHO	WHEN	STATUS
1	UNDER FILL ALL VALVES	OVER HULL FOR ALL VALVE(O RING, SPRING,DIAPHRAM)	HIGH	KAMAL	JUN-JULY	ADJUST + CHANGE
2	RUBBER SEAL	OVER HAULL RUBBER FOR ALL VALVES	HIGH	KAMAL	SEP-JAN	ADJUST + CHANGE
3	TIMING BELT	REPLACE ALL TTIMING BELT WITH PULLY	LOW	KAMAL	SEP-JAN	ADJUST + CHANGE
4	REPLACE BEARING OF MAIN DRIVE GEAR	REPLACING BEARING GEAR	LOW	KAMAL	SEP-JAN	BENDING

4.2 Standardization:

The base line 0.3% average per week has applied as a new waste rate limited instate of 0.5% average per week.

Fig 4.12 control base line before maintenance

Fig 4.13 control base line after maintenance