REFERENCES

A. Blanton Godfrey. Quality Management. Available from: www.qualitydigest.com/apr/godfrey.html

A.V. Feigenbaum. Total Quality Control. (n.p.): Mcgraw-Hill Book Company.

B.G. Dale and J.J. Plunkett. Quality Costing. (n.p.): 3rd Edition. Gower, 1999.

BS6143 (Part 1). Guide to the Economics of Quality. Process Cost Model. (n.p.): 1992.

BS6143 (Part 2). Guide to the economics of quality prevention, Appraisal and Failure Cost Model. (n.p.): 1990.

Cem Kaner. Quality Cost Analysis : Benefits and Risks. Available from: www.Kaner.com/qualcost.htm.

Dale H Besterfield. Quality Control. (n.p.): Prentice Hall, 1992.

Jack Campanella. Principles of Quality, Cost Principles, Implementation and Use. 3rd Edition. (n.p.): ASQ Quality Press, 1999.

Jacobsen. Cost of Quality. Available from: www.quality qadas.com/qadas/iso/iso-hm/2025.html

J.M. Juran, Frank M. Gryna. Quality Planning and Analysis. (n.p.): 3rd Edition. McGraw Hill, 1993.

John S. Oakland & Leslie J. Porter. Total Quality Management. (n.p.): Butter worth Heinemann, 1995.

National Cost of Quality (NCOQ). Sustaining Competitiveness through Cost Management. Available from: www.psb.gov.sg/consultancy/Ncoq/literatureandlinks.html.

Paul T J James. Total Quality Management. (n.p.): Prentice Hall, 1996.

Roger Garver. The Cost of Quality Concept and Superior Service. Available from: www.distribution-solution.com/newpage8.html

Stephen R. Schmidt, Mark J. Kiemele, Tom F. Cheek, Jr. Don't Let TQM Drain You Dry Without Any ROI. Texas Instruments Defense Electronics Systems. Available from: www.airacad.com/Netscape/Papers/DontLetTQM.html

William Keogh, John F. Dalrymple. Quality Cost Systems and Human Interaction: Lessons from a Case Study. Third International & Sixth National Research Conference on Quality Management, RMIT University.

Yiming Gong. Quantity Management. (n.p.): Fudan University press, 1999.

APPENDICES

Appendix A

Report Format

Quality Cost Report

Quality cost report						
Group :				Division :		
Unit :				Period:		Year
Current period				Year to date		
Budget	Actual costs	Difference		Budget	Actual costs	Difference
			Prevention Quality			
			Total prevention cost			
			% of total quality cost			
			Appraisal costs Receiving inspection Inspection and testing Inspection and test equipment Approvals and endorsements			
			Total appraisal cost			
			% of total quality cost			

Quality cost report						
Group :				Division :		
Unit :				Period:		Year :
Current period				Year to date		
Budget	Actual costs	Difference		Budget	Actual costs	Difference
			Internal failure costs Scrap Replacement, rework and repair Re-inspection and re-testing			
			Total internal failure cost			
			% of total quality cost			
			External failure costs Warranty claims Recall costs			
			Total external failure cost			
			% of total quality cost			
			Total quality cost (TQC)			

Typical ratios

TQC as a percentage of :

TQC X 100 / Sales revenue	%	**ales revenue**	TQC X 100 / Sales revenue	%
TQC X 100 / Value asset	%	**alue added**	TQC X 100 / Value asset	%
TQC X 100 / Value asset	%	**irect labor costs**	TQC X 100 / Value asset	%

Distribution :

Issued by : Date :

Appendix B

Quality Cost Report in Year 2001 & format

Quality costs report in year 2001 (product B)

Cost element		Recorded Cost (Unit: Baht)												Annual cost	Notes
		The first 5 months					The rear 5 months								
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
A1	Quality planning	17,500	17,500	17,500	17,500	21,000	21,000	21,000	21,000	21,000	21,000	21,000	21,000	238,000	
A4	Calibration, verification	16,432	49,750	19,040	54,169	47,922	33,797	51,713	52,559	65,213	30,863	27,453	78,187	527,098	
A6	Quality training			15,750		3,150		8,508	3,360	3,325	10,080			44,173	
A9	Quality improvement program	28,000	28,000	30,000	28,500	32,500	29,000	38,500	38,500	38,500	30,000	38,500	38,500	1,147,564	
Total		**61,932**	**95,250**	**82,290**	**100,169**	**104,572**	**83,797**	**119,721**	**115,419**	**128,038**	**91,943**	**86,953**	**137,687**	**1,207,771**	
Sub total		**444,213**					**538,918**					**224,640**			
B2	Receiving inspection	26,250	26,250	26,250	26,250	31,500	31,500	31,500	31,500	31,500	31,500	31,500	31,500	357,000	
B4	Inspection and testing	182,000	182,000	182,000	217,000	217,000	217,000	217,000	217,000	217,000	217,000	217,000	217,000	741,300	
B5	Equipment for testing and inspection	149,625	149,625	149,625	149,625	154,000	154,000	154,000	157,500	157,500	157,500	157,500	157,500	1,848,000	
B9	Approval and acceptance testing	26,250	26,250	26,250	26,250	33,250	33,250	33,250	36,750	36,750	38,500	35,000	35,000	386,750	
Total		**384,125**	**384,125**	**384,125**	**419,125**	**435,750**	**435,750**	**435,750**	**442,750**	**442,750**	**444,500**	**441,000**	**441,000**	**5,055,750**	
Sub total		**2,007,250**					**2,201,500**					**882,000**			
C1	Scrap	249,420	209,203	395,931	100,653	232,212	315,533	230,212	320,132	292,340	202,120	320,102	252,348	3,120,206	
C2	Rework/repair	75,281	64,360	73,870	39,271	126,049	63,224	338,258	257,595	127,770	172,900	500,999	242,183	2,452,408	
C4	Re-inspection/re-testing	96,256	83,968	31,130	29,491	36,564	41,574	122,060	108,542	52,838	187,085	149,606	120,115	1,059,229	
Total		**420,957**	**357,531**	**500,931**	**169,415**	**394,825**	**420,331**	**690,530**	**686,269**	**472,948**	**562,105**	**970,707**	**614,646**	**6,631,843**	
Sub total		**1,843,659**					**2,832,183**					**1,585,353**			
D2	Warranty claims	230,000	550,000	738,000	430,000	250,000	160,000	110,000	70,000					2,538,000	
D6	Recall cost	8,985						14,545	8,490	28,609		21,924		82,553	
Total		**238,985**	**550,000**	**738,000**	**430,000**	**250,000**	**160,000**	**124,545**	**78,490**	**28,609**		**21,924**		**2,620,553**	
Sub total		**2,206,985**					**391,644**					**21,924**			
Grand total		**6,502,107**					**5,964,245**					**2,713,917**		**15,180,269**	

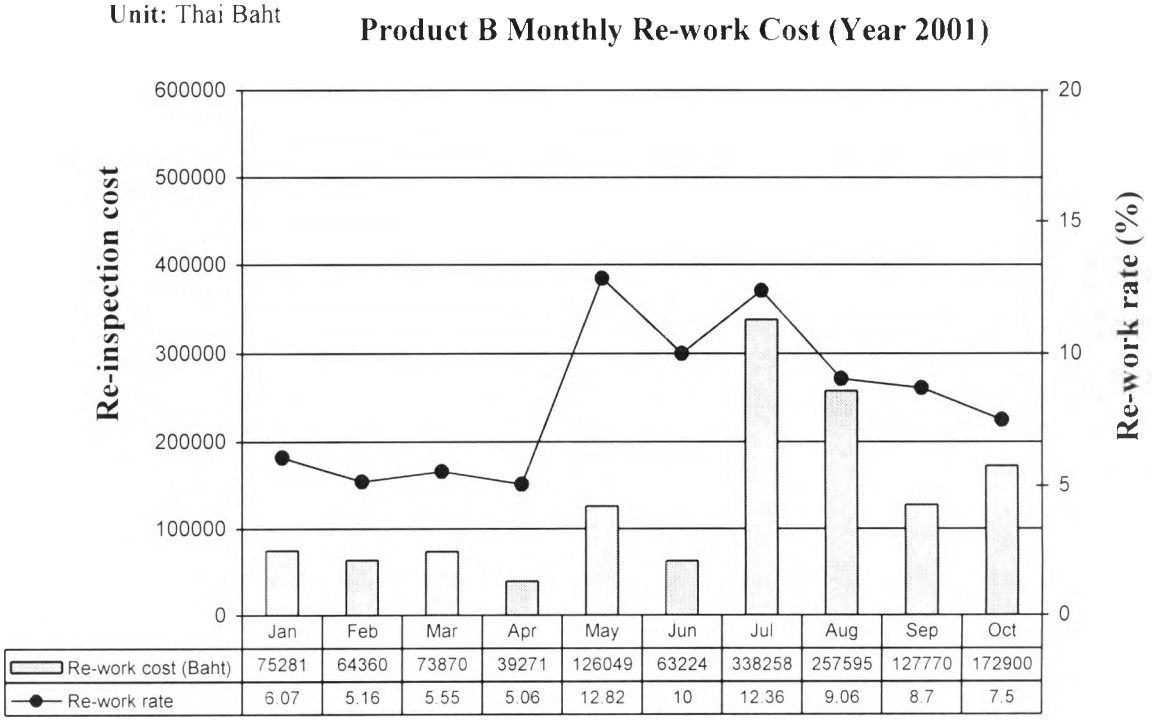
Appendix C

Product B Monthly Rework Quantities and Rework Costs

Product B monthly rework quantities and rework cost status is as below.

Month	IPQC yield (%)	Re-work cost (Thai Baht)	Output Q'ty	Re-work rate
Jan	93.93	75,281	48,446	6.07
Feb	94.84	64,360	48,722	5.16
Mar	94.45	73,870	51,992	5.55
Apr	94.94	39,271	30,317	5.06
May	87.18	126,049	38,407	12.82
Sub total	93.06	378,831	217,884	6.94

Month	IPQC yield (%)	Re-work cost (Thai Baht)	Output Q'ty	Re-work rate
Jun	90.00	63,224	24,697	10.00
Jul	87.64	338,258	106,903	12.36
Aug	90.94	257,595	111,063	9.06
Sep	91.30	127,770	57,368	8.70
Oct	92.50	172,900	90,052	7.50
Sub total	90.48	959,747	390,083	9.52



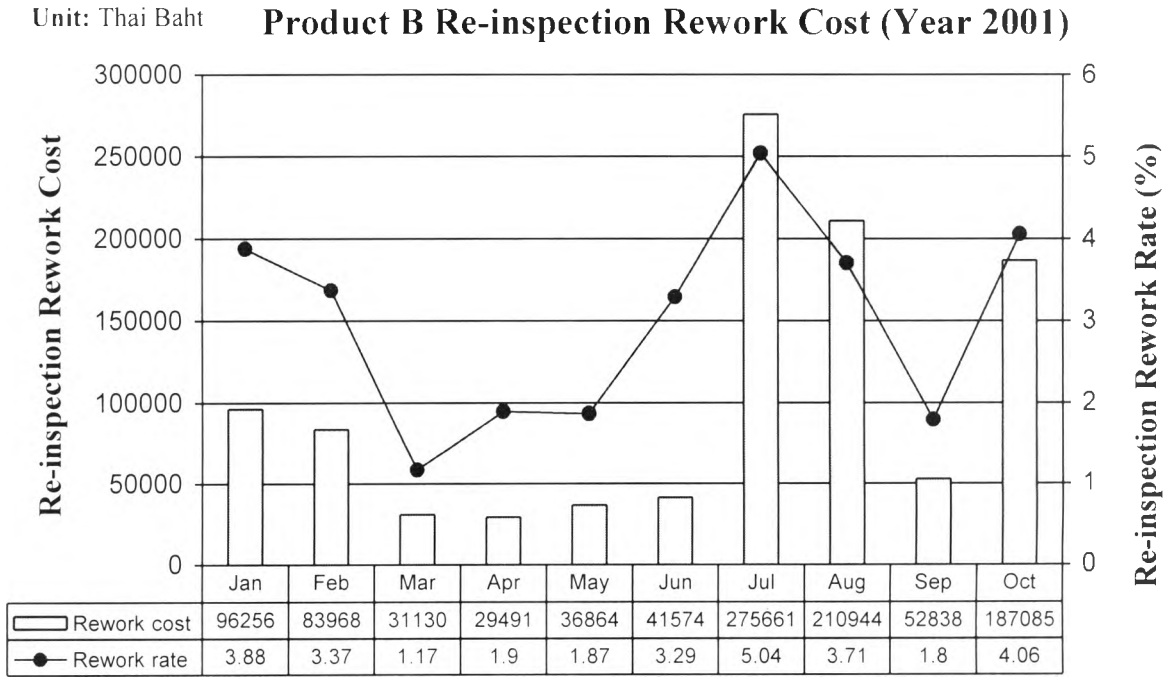
Appendix D

Product B Monthly Re-inspection Rework Costs and Quantities

Product B monthly re-inspection rework cost and quantities of year 2001

Month	Rework Q'ty	Rework cost (Thai Baht)	Output Q'ty	Rework rate
Jan	1,880	96,256	48,446	3.88%
Feb	1,640	83,968	48,722	3.37%
Mar	608	31,130	51,992	1.17%
Apr	576	29,491	30,317	1.90%
May	720	36,864	38,407	1.87%
Sub total	5,424	277,709	217,884	2.49%

Month	Rework Q'ty	Rework cost (Thai Baht)	Output Q'ty	Rework rate
Jun	812	41,574	24,697	3.29%
Jul	5,384	275,661	106,903	5.04%
Aug	4,120	210,944	111,063	3.71%
Sep	1,032	52,838	57,368	1.80%
Oct	3,654	187,085	90,052	4.06%
Sub total	15,002	768,102	390,083	3.85%

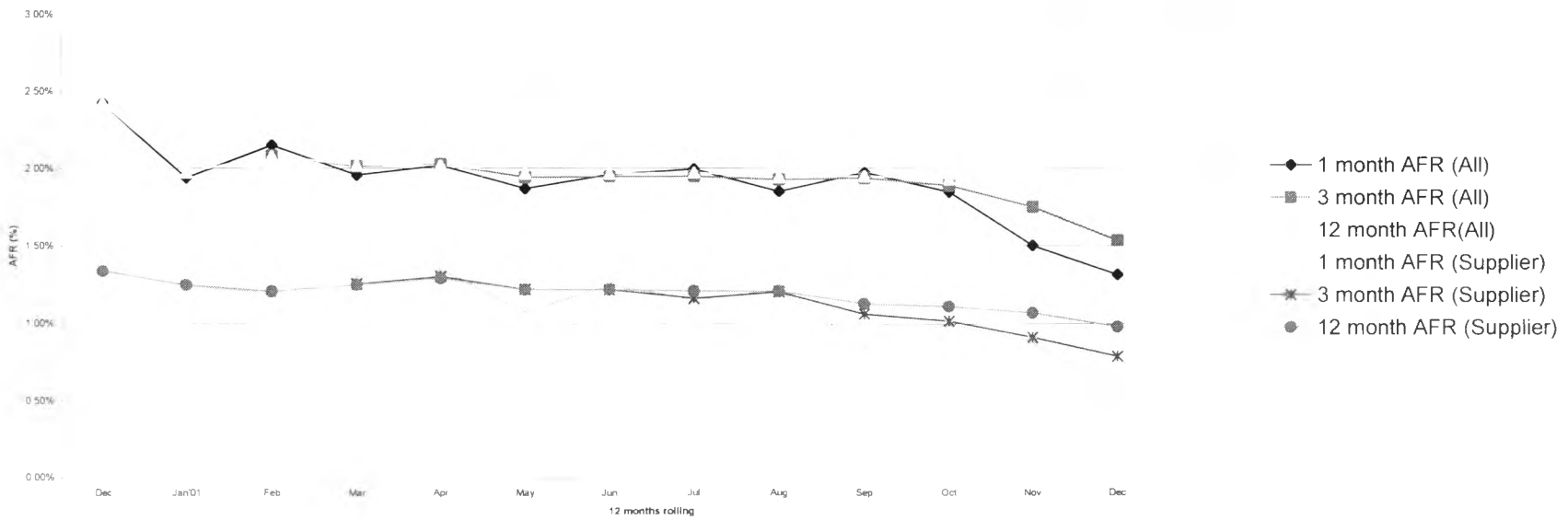


Appendix E

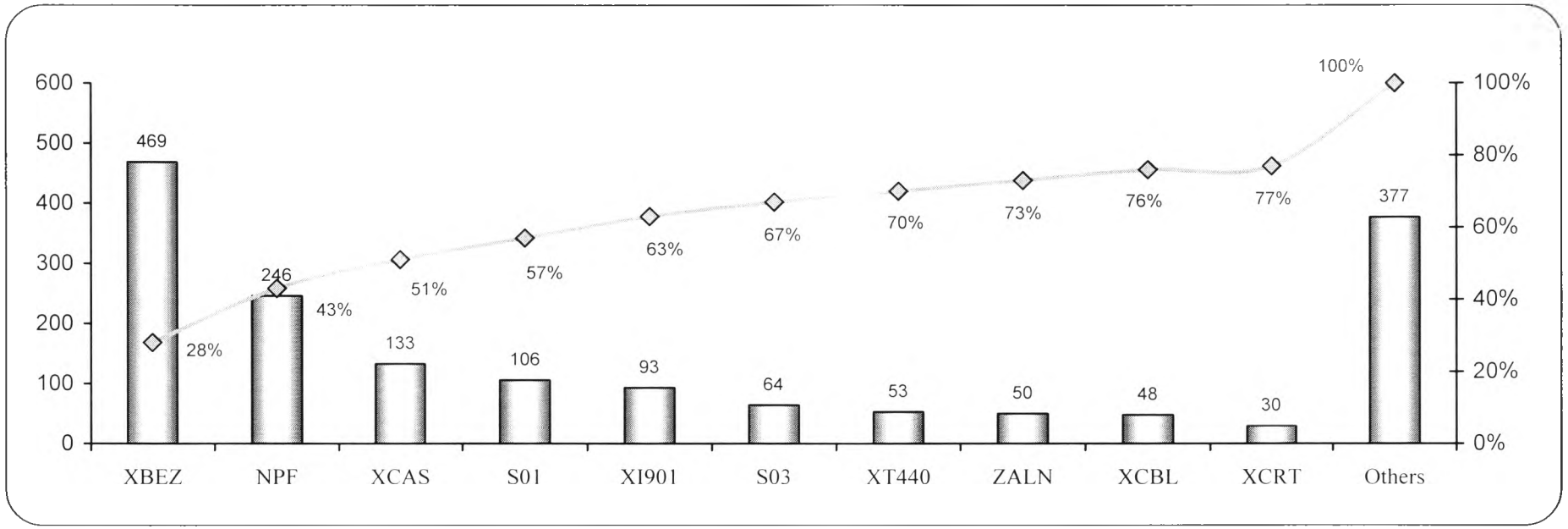
Product B Failure Defect

AFR Calculation Spread Sheet (Worldwide)

Model: Product B		1	2	3	4	5	6	7	8	9	10	11	12	13
Month	Nov'00	Dec	Jan'01	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Units Shipped (units)		4457	52520	34540	50804	82562	52389	43703	54127	94957	13986	72424	95724	42674
Installed Base (units) 12 months		4457	56977	91517	142321	224883	277272	320975	375102	470059	484045	556469	652193	690410
Failures (units) -all returns		9	92	164	232	378	432	524	623	725	795	856	816	756
1 Month AFR(all)(%)		2.42%	1.94%	2.15%	1.96%	2.02%	1.87%	1.96%	1.99%	1.85%	1.97%	1.85%	1.50%	1.31%
3 Month AFR(all) (%)				2.08%	2.01%	2.02%	1.94%	1.94%	1.95%	1.93%	1.93%	1.89%	1.75%	1.53%
12 Month AFR (all)(%)		2.42%	1.97%	2.08%	2.02%	2.02%	1.97%	1.96%	1.97%	1.94%	1.95%	1.93%	1.85%	1.77%
Failures (units) - supplier related c		5	59	91	154	253	249	334	361	475	342	463	482	304
1 Month AFR (supplier)(%)		1.35%	1.24%	1.19%	1.30%	1.35%	1.08%	1.25%	1.15%	1.21%	0.85%	1.00%	0.89%	0.53%
3 Month AFR(supplier) (%)					1.25%	1.30%	1.22%	1.22%	1.16%	1.20%	1.06%	1.02%	0.91%	0.79%
12 Month AFR (supplier)(%)		1.34%	1.25%	1.21%	1.25%	1.29%	1.22%	1.22%	1.21%	1.21%	1.13%	1.11%	1.07%	0.98%
AFR Limit (supplier)(%)		1.20%	1.20%	1.20%	1.20%	1.20%	1.20%	1.20%	1.20%	1.20%	1.20%	1.20%	1.20%	0.80%

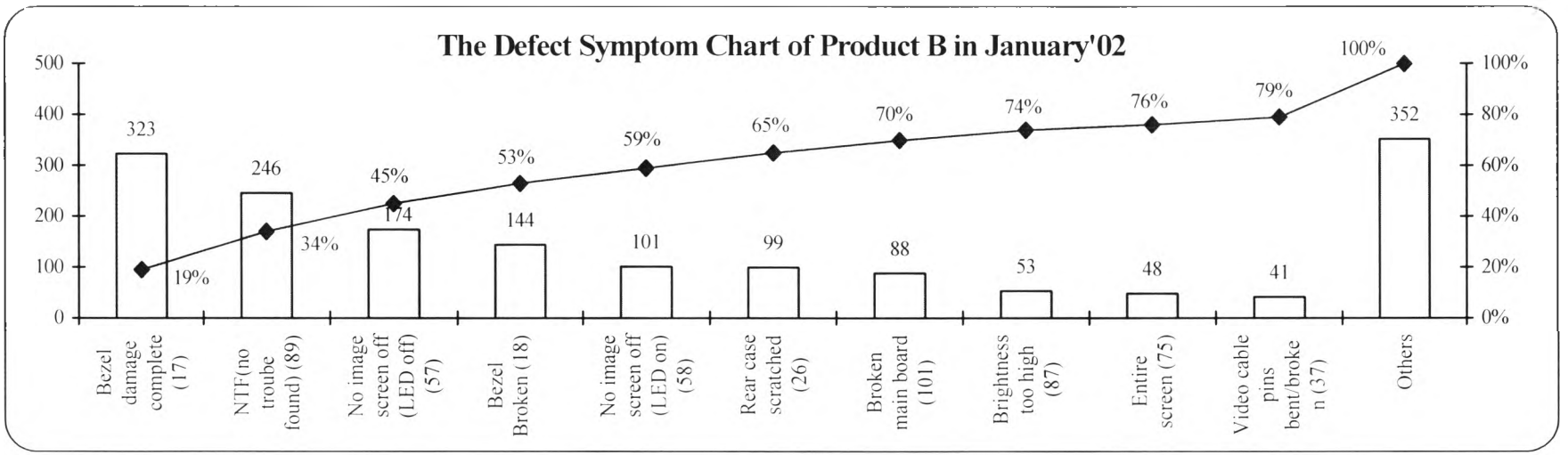


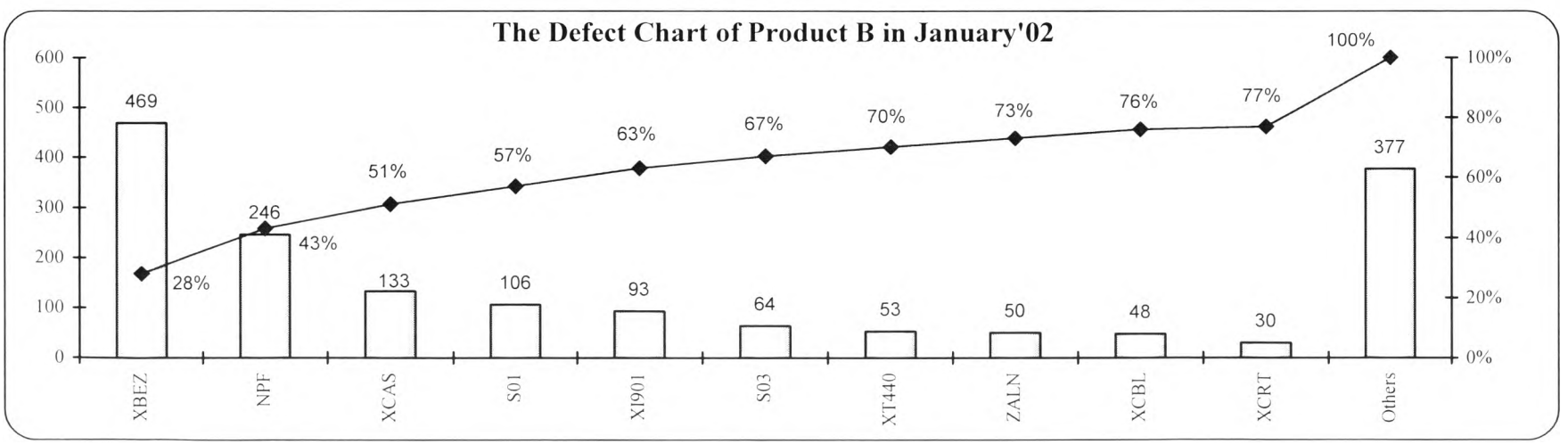
Top 10 Pareto of Product B Failure Defect



Top	Defect Symptom	Defect Q'ty
1	XBEZ	469
2	NPF	246
3	XCAS	133
4	S01	106
5	XI901	93
6	S03	64
7	XT440	53
8	ZALN	50
9	XCBL	48
10	XCRT	30
	Others	377
Total		1669

Top 10 Pareto of Product B Failure Defect





Product B Total Failure Defect Year 2000

Top	Month	Sep	Oct			Nov				Dec			Total
	Defect part / Week	37	42	43	44	45	46	47	48	49	50	51	
1	XBEZ	1	3		5	3	7	7	27	9	14		76
2	NPF		3		3	7	4	5	11	7	6		46
3	XCAS		2		3	4	4	3	5		10		31
4	S01		1		1	2	5	4	11	4	2		30
5	XI901				1	1	1	1	2	1		3	10
6	S03	1	1			3	2	1	1		1	1	11
7	XT440					3		1	3	6	2		15
8	ZALN						1	1	5		5		12
9	XCBL				2	4	1	1	1	1	2		12
10	XCRT		3		1	1	2			1			8
11	XUCP				1			1			2		4
12	XI904						1	1	1		1		4
13	ZDEG			1			1				1		3
14	XI902					2				1			3
15	ZG2								1	2			3
16	LCBL					1	1	1					3
17	S05					1	1	1	1		1		5
18	ZFOCUS							1					1
19	XQ868				1		1		1				3
20	XDBD							1	1				2
21	LCAS						1		1		1		3
22	XQ433							1	1		1		3
23	XF801		1								1		2
24	XABD												
25	XD806												
26	XI901, YT440						1						1
27	LCBL PINS						1		1				2
28	XI401						1	1		1			3
29	YQ868					2							2
30	Others	0	5	0	8	4	3	5	6	3	5	0	39
Total of each week		**2**	**19**	**1**	**26**	**38**	**39**	**37**	**80**	**36**	**55**	**4**	337
Total of each month		**2**	**46**			**194**				**95**			
Total of production input monthly			**5810**			**78210**				**44004**			
DPPM			**7917**			**2481**				**2159**			

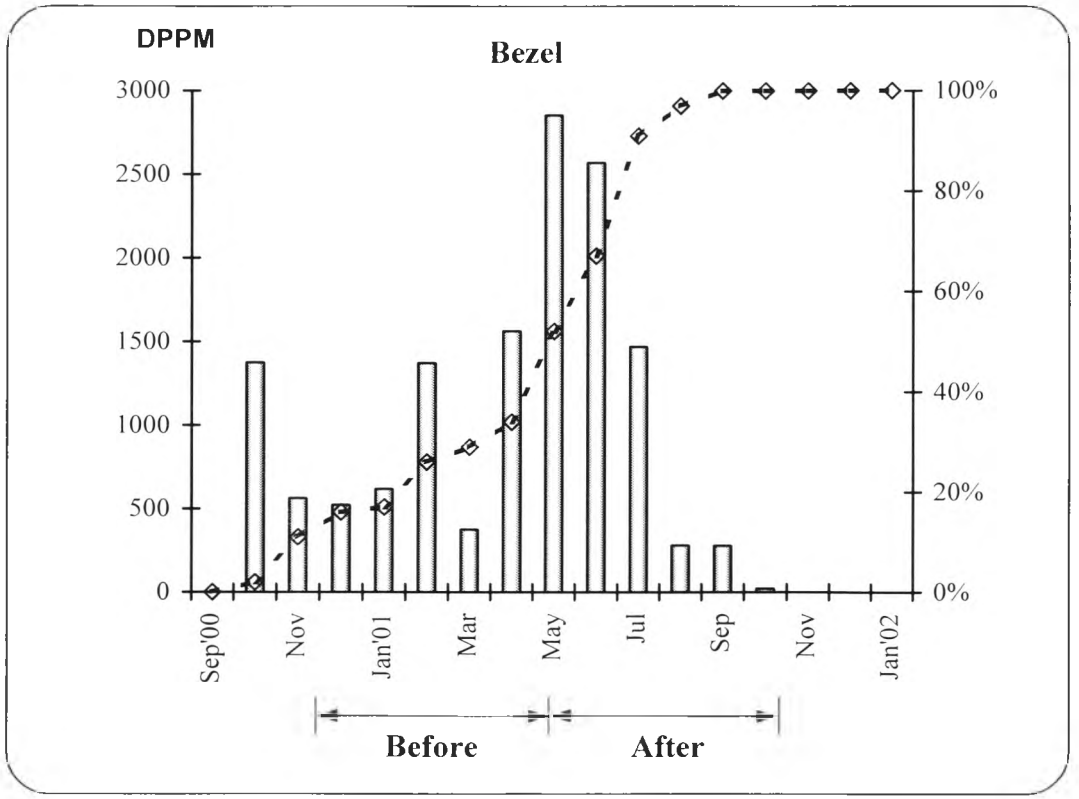
Product B Total Failure Defect Year 2001

Top	Month	Jan		Feb				Mar					Apr				May				Jun					Jul				Aug				Sep					Oct	Nov			Total
	Defect part / Week	01	02	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	41	45	46	47	
1	XBEZ	4	1	10	13	11	6	2	2	4		5	5	6	5	8	16	14	20	35	10	29	2		28	18	33	42	24	16	4	4	3			5	1	6	1				393
2	NPF	1		5	2	2	3	2	1		3	2		2	2	1	4	9	9	3	1	8	2	2	4	16	6	24	21	25	11	9	6		1	4	1	2	4	1		1	200
3	XCAS		1	3	5	3	2	1			1		1	3	1	2	1	2	3	6	5	7			7	8	7	10	6	7	5	1	1		1	1		1					102
4	S01			2	2	1		1	2		1	5	3	4		2	1	1	2	7	3	1			1	2	6	5	7	1	3	2	3	1	2	2		1	2				76
5	XI901			1	2		1	1	4	2		2		1		3	3	1		5		3			2	1	3	8	11	11	5	1		1	4	2		4			1		83
6	S03		1			1	1		1	1	2	1	1		1	2		1	4	3	3	2	2		4	2	3	2	2	3	1	2	3	2		1				1		53
7	XT440		1	1	1	2		1		1	1	1		2			1	1	2	1	1	2		1		1	5	4	1	1	1			2		1		1				1	38
8	ZALN					1		1	2		1		1	3		2			1		2			1	3	2	2	1	3	7	3	1									1		38
9	XCBL		1	1				1		1			2	1		1		2	1	1	2				1	2		2	7	3	2	1			1			2				1	36
10	XCRT				1		1					1				2	2	1	1	3			1				1	2		2		1	1		1							1	22
11	XUCP				1					1				1		1			1	1		2			2	1	2			1		1					1		1					17
12	XI904		1				1									1				1		1	1		1		2	2	1	1													13
13	ZDEG		1				1													1	1	1	1			1	2	2										1					12
14	XI902				1		1		1	1											1						1	1	1	1							1		1					11
15	ZG2						2			1								1			1					1	3		1			1												11
16	LCBL													1								1			1	1	2	1	2		1												10
17	S05	1																1		1							1		1	1						1		1					8
18	ZFOCUS									1		1								1								2	4			1	1		1								12
19	XQ868										1												1				1	1			2		1			1							8
20	XDBD		1			1													1			1				1	2		1														8
21	LCAS											1														2		3																6
22	XQ433				1					1											2		1							1														6
23	XF801		1																			1	1				2	1																6
24	XABD																					1						1	2	3														7
25	XD806																				1	3	1					1			1													7
26	XI901, YT440											1		1								1						1	2															6
27	LCBL PINS												1			1				1											1													4
28	XI401											1																									1							3
29	YQ868			1		1																							1														4
30	Others	1	2	1	2	4	2	2	5	1		2	4	4			2	4	2	8	1	4	3	2	2	4	10	12	11	10	3	6			6	5		3	2	1		1	132
Total of each week		7	11	25	31	27	21	12	19	16	10	23	18	29	9	26	30	38	47	78	34	68	16	6	56	62	93	130	108	95	43	31	19	6	17	25	2	24	10	2	3	5	1332
Total of each month		18		104				80					82				193				180					393				188				74				10	10			
Total of production input monthly		8064		29151				34666					15360				29782				29230					79576				96534				43320				48450	85500			
DPPM		2232		3568				2308					5339				6480				6158					4939				1948				1708				206	117			

Top 5 Pareto of Product B Failure Defect per Production Month

Top 1: Bezel defect symptom

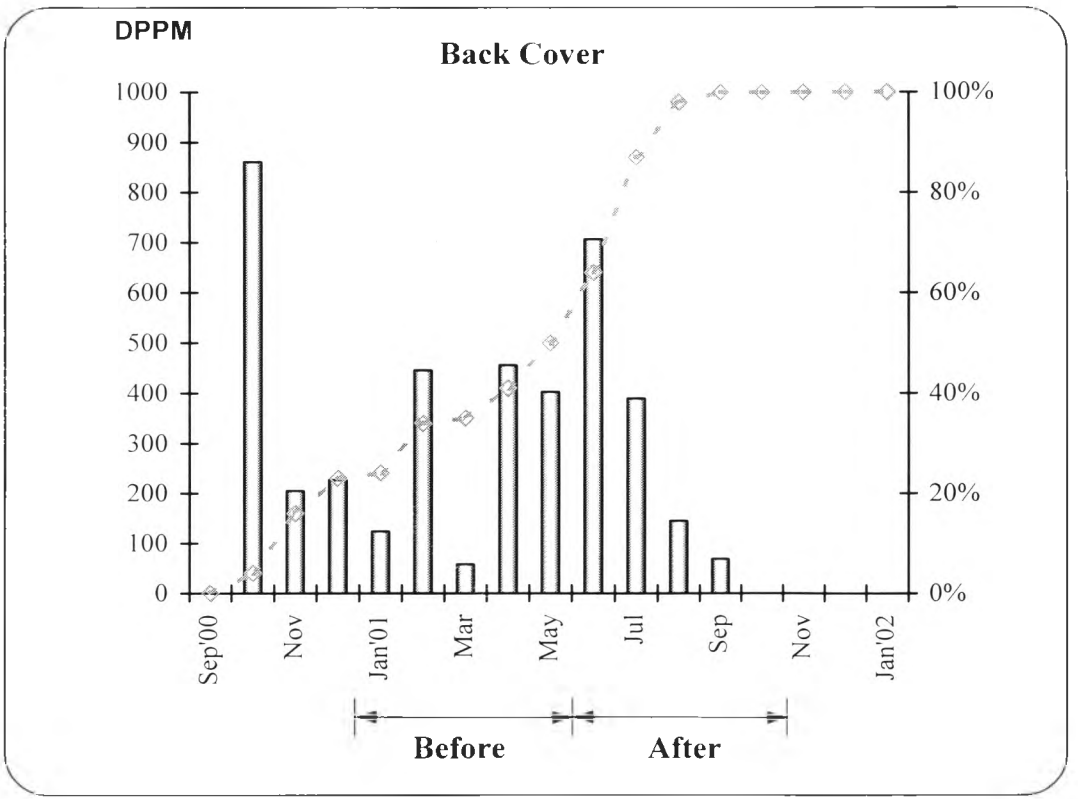
Production month	Defect Q'ty	Production Q'ty	DPPM
Sep'00	1		0
Oct	8	5810	1377
Nov	44	78210	563
Dec	23	44004	523
Jan'01	5	8064	620
Feb	40	29151	1372
Mar	13	34666	375
Apr	24	15360	1563
May	85	29782	2854
Jun	69	26870	2568
Jul	117	79576	1470
Aug	27	96534	280
Sep	12	43320	277
Oct	1	48450	21
Nov		85500	0
Dec		28160	0
Jan'02		19352	0
Total	469	672809	697



Top 5 Pareto of Product B Failure Defect per Production Month

Top 2: Back cover defect symptom

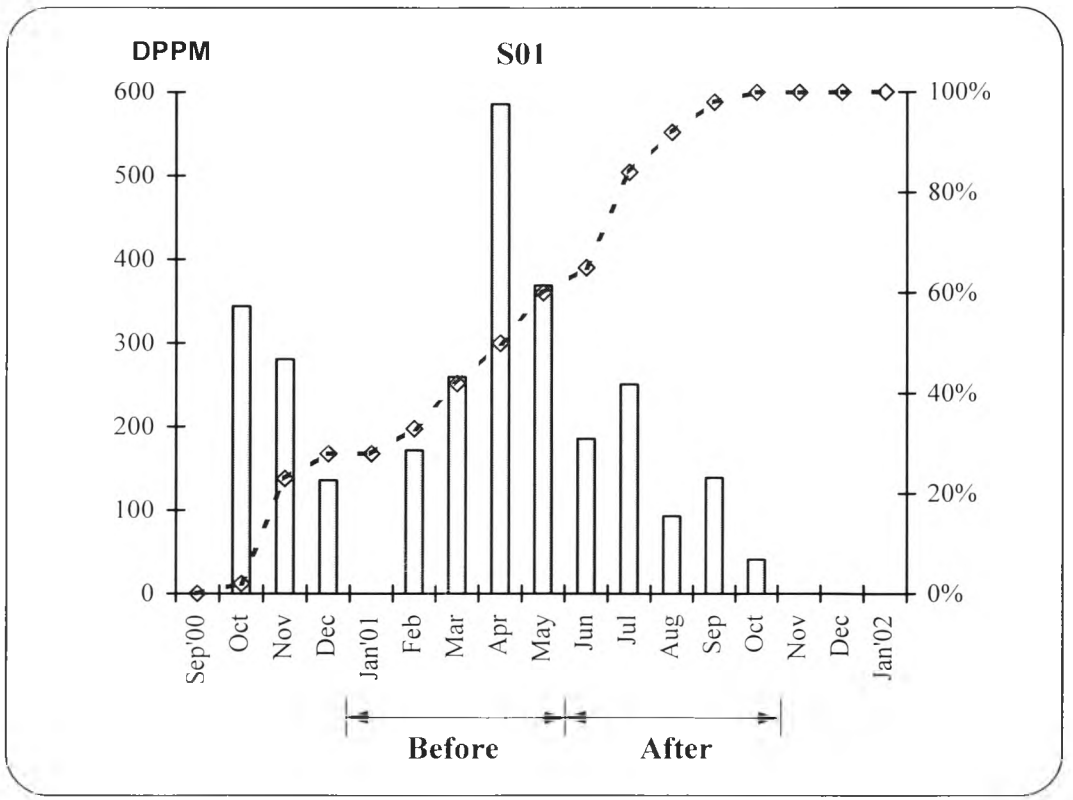
Production month	Defect Q'ty	Production Q'ty	DPPM
Sep'00			0
Oct	5	5810	861
Nov	16	78210	205
Dec	10	44004	227
Jan'01	1	8064	124
Feb	13	29151	446
Mar	2	34666	58
Apr	7	15360	456
May	12	29782	403
Jun	19	26870	707
Jul	31	79576	390
Aug	14	96534	145
Sep	3	43320	69
Oct		48450	0
Nov		85500	0
Dec		28160	0
Jan'02		19352	0
Total	133	672809	198



Top 5 Pareto of Product B Failure Defect per Production Month

Top 3: Excessive Main board damage (S01) defect symptom

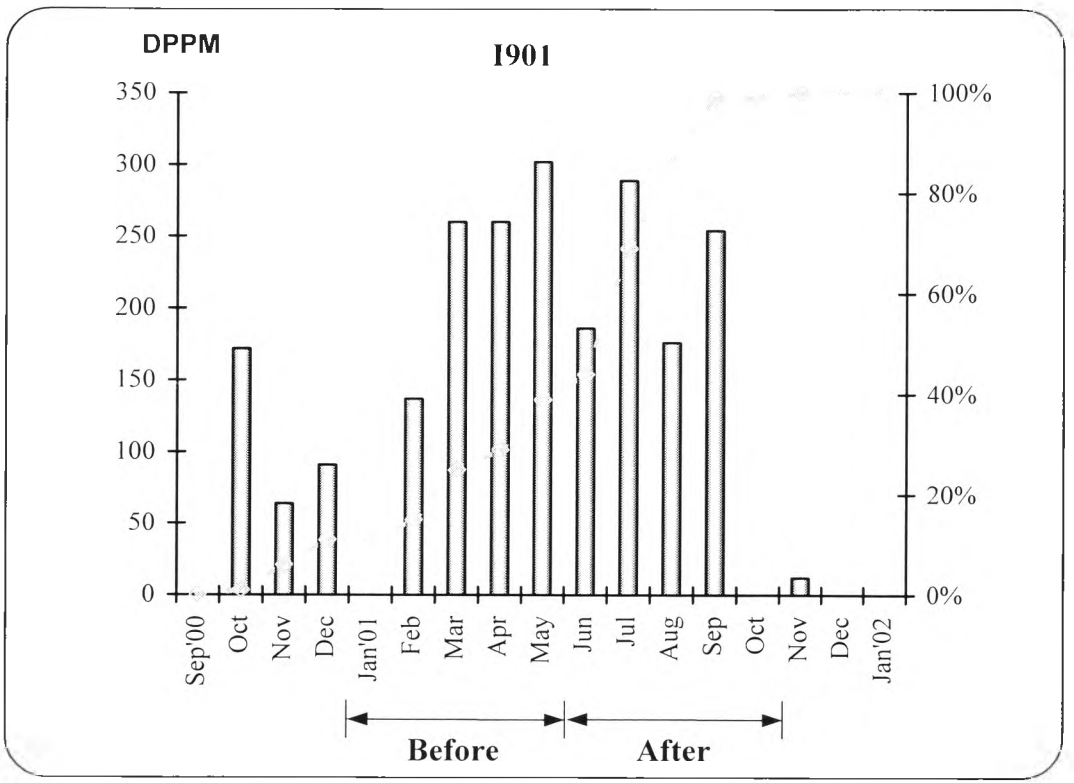
Production month	Defect Q'ty	Production Q'ty	DPPM
Sep'00			0
Oct	2	5810	344
Nov	22	78210	281
Dec	6	44004	136
Jan'01		8064	0
Feb	5	29151	172
Mar	9	34666	260
Apr	9	15360	586
May	11	29782	369
Jun	5	26870	186
Jul	20	79576	251
Aug	9	96534	93
Sep	6	43320	139
Oct	2	48450	41
Nov		85500	0
Dec		28160	0
Jan'02		19352	0
Total	106	672809	158



Top 5 Pareto of Product B Failure Defect per Production Month

Top 4: I901 defect symptom

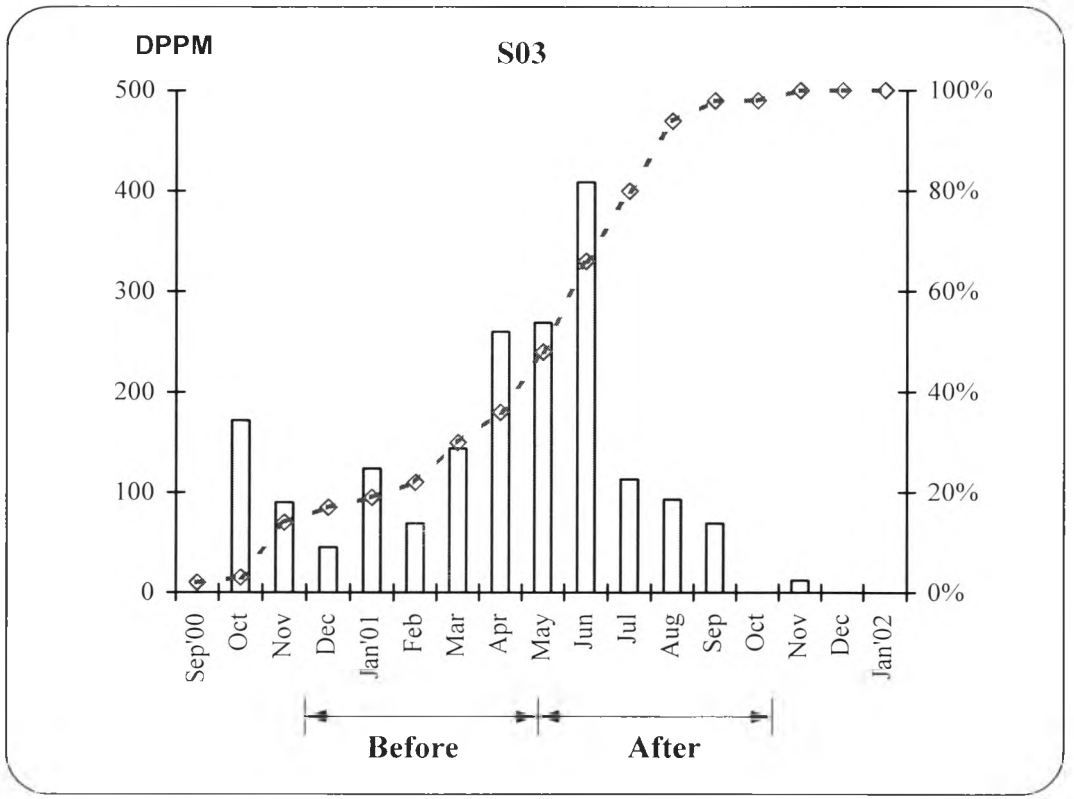
Production month	Defect Q'ty	Production Q'ty	DPPM
Sep'00			0
Oct	1	5810	172
Nov	5	78210	64
Dec	4	44004	91
Jan'01		8064	0
Feb	4	29151	137
Mar	9	34666	260
Apr	4	15360	260
May	9	29782	302
Jun	5	26870	186
Jul	23	79576	289
Aug	17	96534	176
Sep	11	43320	254
Oct		48450	0
Nov	1	85500	12
Dec		28160	0
Jan'02		19352	0
Total	93	672809	138



Top 5 Pareto of Product B Failure Defect per Production Month

Top 5: Excessive CRT damage (S03) defect symptom

Production month	Defect Q'ty	Production Q'ty	DPPM
Sep'00	1		0
Oct	1	5810	172
Nov	7	78210	90
Dec	2	44004	45
Jan'01	1	8064	124
Feb	2	29151	69
Mar	5	34666	144
Apr	4	15360	260
May	8	29782	269
Jun	11	26870	409
Jul	9	79576	113
Aug	9	96534	93
Sep	3	43320	69
Oct		48450	0
Nov	1	85500	12
Dec		28160	0
Jan'02		19352	0
Total	64	672809	95



Corrective action report of field return

Top	Defect description	Root cause	Corrective Action	Owner	Cut-in date	Effectiveness
1	Defect: Bezel replace	R/C: Bezel broken happened due to user handling or transportation w/o appropriate packing way (non-supplier)	(1) Request all the return units to Jabil must be packaged by EPS from now on. Jabil and Tatung have already informed HP to take necessary actions. (2) Request Jabil to add a code to indicate w/o EPS or inappropriate packing way in the repair report. (3) Tatung will perform on-going package test to monitor the mechanical quality.	(1) HP (2) Jabil (3) TTL J.H.Jang	(1) 2001/8/8 (2) 2002/03/20 (3) Continue	
2	Defect: NPF	Tatung suggests HP check the call center records to find the reason from customers.				
3	Defect: Back cover replace	Back cover step up on or separate from bezel due to user handling or transportation w/o appropriate packing way from broker to Jabil (non-supplier)	(1) Request all the return units to Jabil must be packaged by EPS from now on. Jabil and Tatung have already informed HP to take necessary actions. (2) Request Jabil to add a code to indicate w/o EPS or inappropriate packing way in the repair report (3) Tatung will perform ongoing package test to monitor the mechanical quality.	(1) HP (2) Jabil (3) TTL J H.Jang	(1) 2001/8/8 (2) 2002/03/20 (3) Continue	
4	Defect: Excessive Main board damages (scrap)	(1) Most of main board broken It may be user handling or transportation to cause it (non-supplier). (2) 20 pcs of no image problem. (3) 2 pcs of slap test failed.	(1) Request all the return units to Jabil must be packaged by EPS from now on. Jabil and Tatung have already informed HP to take necessary actions. (2) Request Jabil to add a code to indicate w/o EPS or inappropriate packing way in the repair report. (3) Tatung will perform ongoing package test to monitor the mechanical quality. (4) Tatung requested Jabil to repair the main boards instead of directly exchange and provide the error code for R&D analysis.	(1) HP (2) Jabil (3) TTL J.H.Jang (4) Jabil	(1) 2001/8/8 (2) 2002/03/20 (3) Continue (4) 2002/03/20	

Corrective action report of field return (continue)

Top	Defect description	Root cause	Corrective Action	Owner	Cut-in date	Effectiveness
5	Defect: I901 replace	Most are arcing damage	(1) Add the resistors (R912, R942, R972), P/N. 5142133095 33W PWB-0226-06 (2) Add spark gap (Z974) , date: Jan. 07. 2002. Ref. to PCN. No. 01-705	(1) R&D C.T. Leu (2) TTL J.H.Jang	Cut-in S/N. THTEB01037	
6	Defect: Excessive CRT damage (scrap)	(1) Most of CRT neck broken, CRT scratch, CRT damage shadow mask happened. It may be user handling or transportation to cause it (non-supplier). (2) Focus fog, bad purity, brightness too low/high may be CRT issue (supplier). (3) Two phosphor spot in center. It is CRT problem (supplier).	(1) Request all the return units to Jabil must be packaged by EPS from now on. Jabil and Tatung have already informed HP to take necessary actions. (2) Tatung has requested CPT APP in USA to support the failure analysis. CPT APP is now arranging the schedule.	(1) HP (2) CPT/Tatung	(1) 2001/8/8 (2) 2002/03/20	
7	Defect: T440 replace	HV wiring problem	Request vendor to improve the process control this Aug. 2001	TTL Y.T. Wu	Cut-in S/N. THTDF73764	
8	Defect: ZALN	From Jabil repairing, most are aligned by G2, Focus, Degauss, Brightness, C/G, Centering, Size, Color temperature.	(1) Tatung has instructed Jabil to recall the FOS at first inspection (2) Request Jabil to provide the measurement data both original and re-adjust for further analysis. (3) Tatung will send the product spec which tolerance is larger than the service manual. It avoid Jabil to use strict spec. (4) Factory will notice the alignment issue and daily measure data make Cp/Cpk.	(1) Jabil (2) Jabil (3) Tatung / Golden Chiou (4) TTL J.H.Jang	(1) 2001/05/31 (2) 2002/03/20 (3) 2002/03/20 (4) 2002/03/13	
9	Defect: Cable replace	(1) Most of signal cable pins bent / broken. It may be users to insert wrong direction into PC (non-supplier). (2) 5 pcs of video cable intermittent.	(1) Tatung suggest HP to make one piece of quick installation guidance to note the cable assembly. (2) Inform Jabil to send back the failed signal cable for analysis.	(1) HP (2) Jabil / Tatung	(1) 2002/03/20 (2) 2002/03/20	
10	Defect: CRT replace	(1) Most of CRT neck broken, CRT scratch, CRT damage shadow mask happened. It may be user handling or transportation to cause it (non-supplier). (2) Focus fog, bad purity, brightness too low/high may be CRT issue (supplier). (3) Two phosphor spot in center. It is CRT problem (supplier).	(1) Request all the return units to Jabil must be packaged by EPS from now on Jabil and Tatung have already informed HP to take necessary actions. (2) Tatung has requested CPT APP in USA to support the failure analysis. CPT APP is now arranging the schedule.	(1) HP (2) CPT/Tatung	(1) 2001/8/8 (2) 2002/03/20	

Appendix F

Quality Costs Year 2001 All Models

Year 2001 Quality Costs Year 2001 All Models

Prevention Costs

Unit: Million Baht

Cost element		Annual Cost	Source	Notes
A1	Quality planning	0.6	Accounting	
A2	Design and development of measurement, inspection, etc...	4.74	"	From HQ
A3	Quality review and verification of design	0.30	"	From HQ
A4	Calibration, verification	1	"	
A5	Supplier assurance	0.6	"	
A6	Quality training	0.7	"	
A7	Quality auditing	-	"	
A8	Quality data	0.36	"	
A9	Quality improvement program	2	"	
Total		10.78		
Ratio to sales turnover (%)		0.41		

Appraisal Costs

Unit: Million Baht

Cost element		Annual Cost	Source	Notes
B1	PP verification	1.5	Accounting	
B2	Receiving inspection	1.5	"	
B3	Laboratory acceptance testing	0.6	"	
B4	Inspection and testing	7.2	"	
B5	Equipment for testing and inspection	5.2	"	
B6	Consumed material during test and inspection	0.1	"	
B7	Analysis and reporting of test and inspection results	0.6	"	
B8	Stock evaluation	-	"	
B9	Approval and acceptance testing	0.9	"	
Total		17.6		
Ratio to sales turnover (%)		0.67		

Internal Failure Costs

Unit: Million Baht

Cost element		Annual Cost	Source	Notes
C1	Scrap	10.6	Accounting	
C2	Rework/repair	12.96	"	
C3	Trouble shooting/repair analysis	1.4	"	
C4	Re-inspection/re-testing	5.18	"	
C5	Fault of sub-contractor	-	"	
C6	Modification permit and concession	0.72	"	
C7	Downgrading	-	"	
C8	Downtime	16.6	"	
Total		47.46		
Ratio to sales turnover (%)		1.80		

External Failure Costs

Unit: Million Baht

Cost element		Annual Cost	Source	Notes
D1	Customer complaints	0.65	Accounting	
D2	Warranty claims	0.963	"	
D3	Product repeated and returned	2.7	"	
D4	Concession	-	"	
D5	Lost of sales	-	"	
D6	Recall cost	0.8	"	
D7	Product liability	-	"	
Total		5.113		
Ratio to sales turnover (%)		0.19		

Summary Quality Cost in Year 2001

Unit: Million Baht

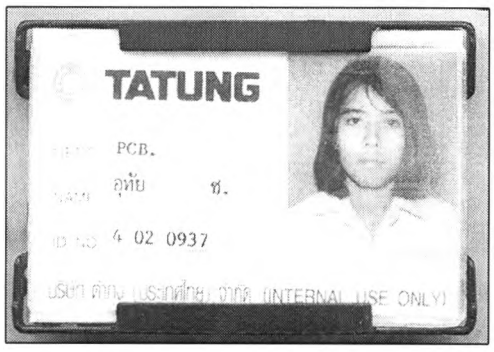
Cost	Annual Cost	Source	Notes
Prevention cost	10.78	Accounting	
Appraisal cost	17.6	"	
Internal failure cost	47.46	"	
External failure cost	5.113	"	
Total	80.953		
Ratio to sales turnover (%)	3.07		

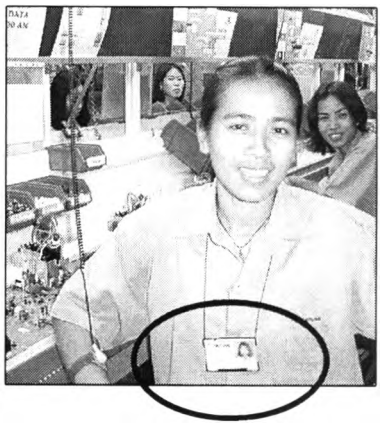
Appendix G

Training Record and Identify Qualification

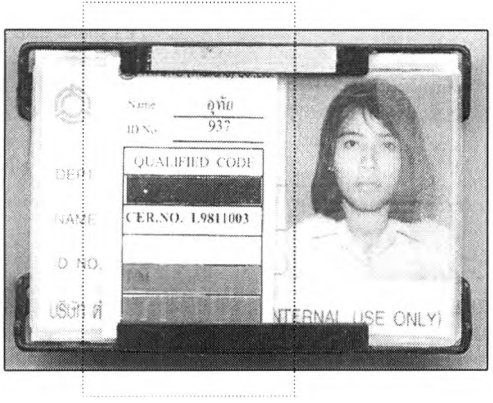
Training record badge to identify qualification

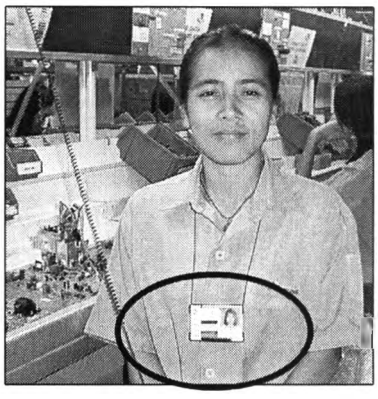
Before





After





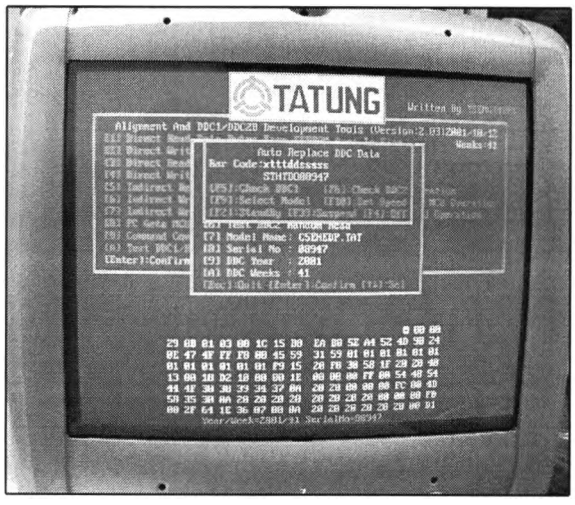
Appendix H

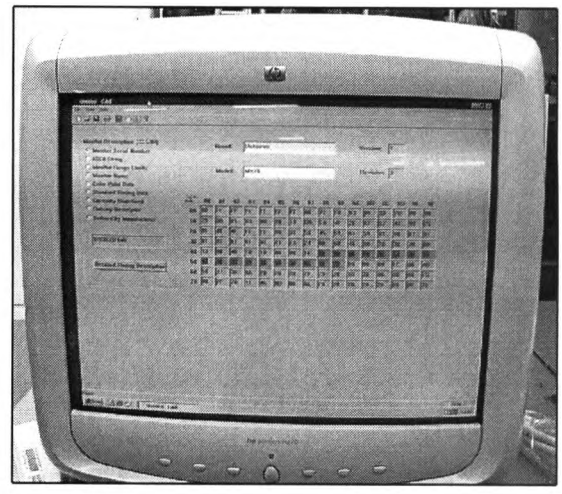
DDC Data Highlight and Failure Code

Computer aided DDC inspection

Phase 1

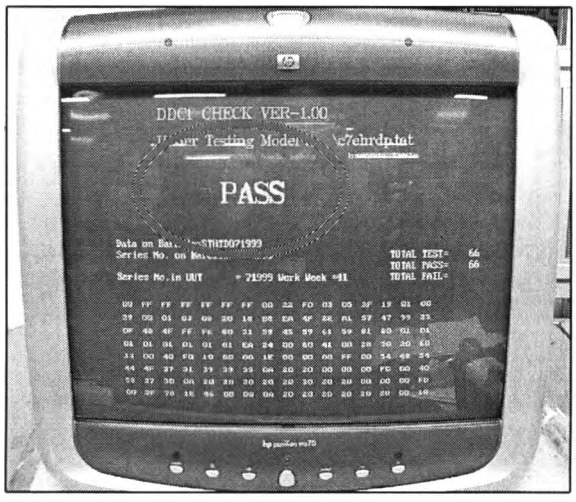
Highlight the EDID

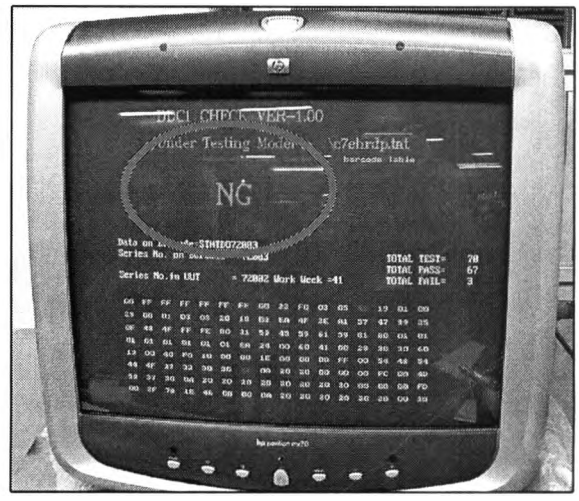




Phase 2

Automatic judge and highlight the failure code if DDC NG



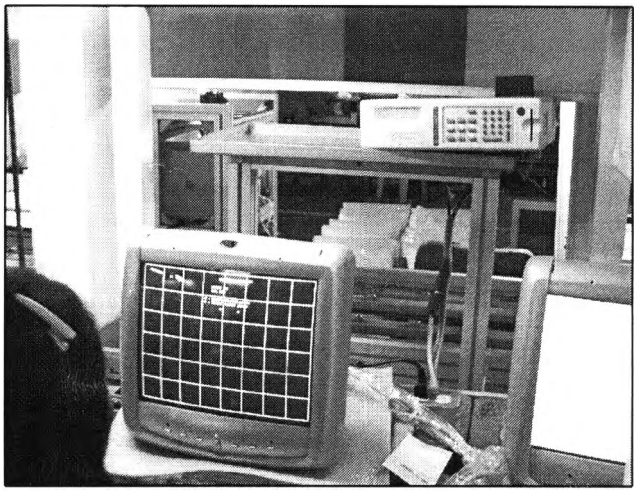


Appendix I

Real Time SPC

Real time SPC for alignment optimization

Before



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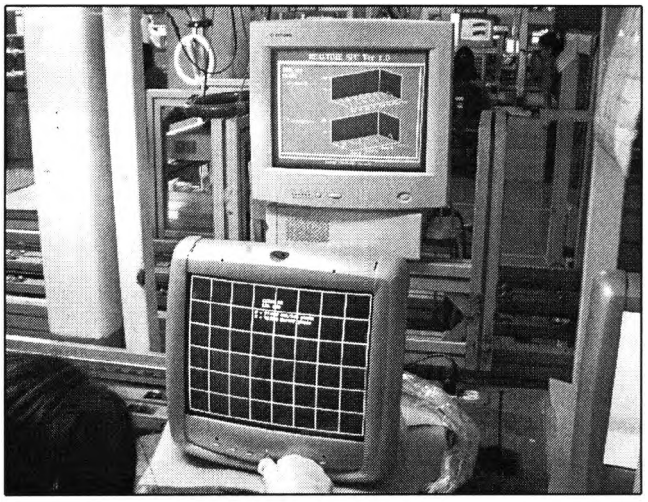

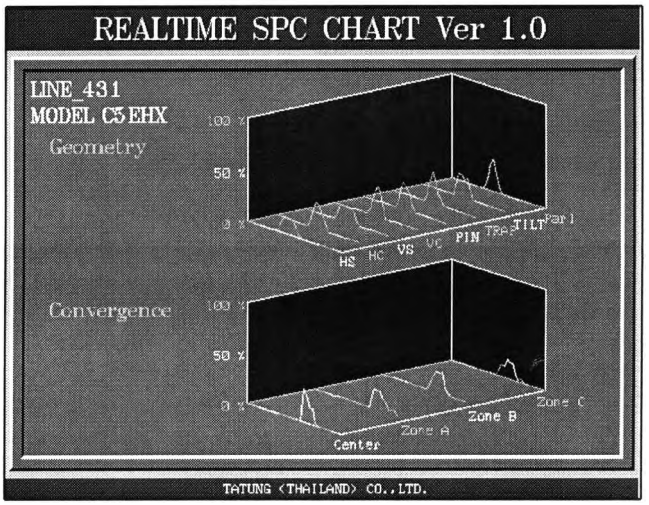

BIOGRAPHY

Mrs. Xiujie Li was born in 1970 in Jilin, China. She graduated from Jilin Professional Teachers University with a bachelor degree in Mechanical Engineering in 1994. She continued her education with master degree in Engineering Management at Chulalongkorn University since 1999.

She used to practice in Broadcasting Equipment Company in Tianjin for one year and then became a quality assurance engineer in Tatung (Thailand) Co., Ltd