

CHAPTER 6

CONCLUSION and SUGGESTION

6.1. Conclusion

From the research, the writer takes conclusion as follow:

- a. The current sampling plan is affordable for LQL value of 4.9% - 6.51%. The usage of the current sampling plan over the LQL limits makes the sampling plan to be obsolescent. The obsolescent sampling plan causes invalid inspection result. The invalid inspection result increases the consumer's risk for P.T. Astra-Daihatsu Motor and yields more claims for P.T. Mekar Armada Jaya.
- b. P.T. Mekar Armada Jaya has to start to do the screening (100% inspection) if the LQL value falls below 4.9%. The acceptance number increase as the LQL decrease, but the acceptance number will be at least equal to 3.

6.2. Suggestion

For further research, researchers can design an integrated plan to construct simplified sampling plan. The sample size is high in the beginning. Within the progress, the sample size can be simplified without making the inspection result to be invalid. The simplification of the sampling plan must be step-by-step to avoid the invalid inspection result. It needs

special analysis to construct the step-by-step simplification plan. Construction of simplified sampling plan can be a potential topic for further research.



REFERENCES

Mitra, Amitava, 1998, *Fundamentals of Quality Control and Improvement*, second edition, Prentice Hall, New Jersey.

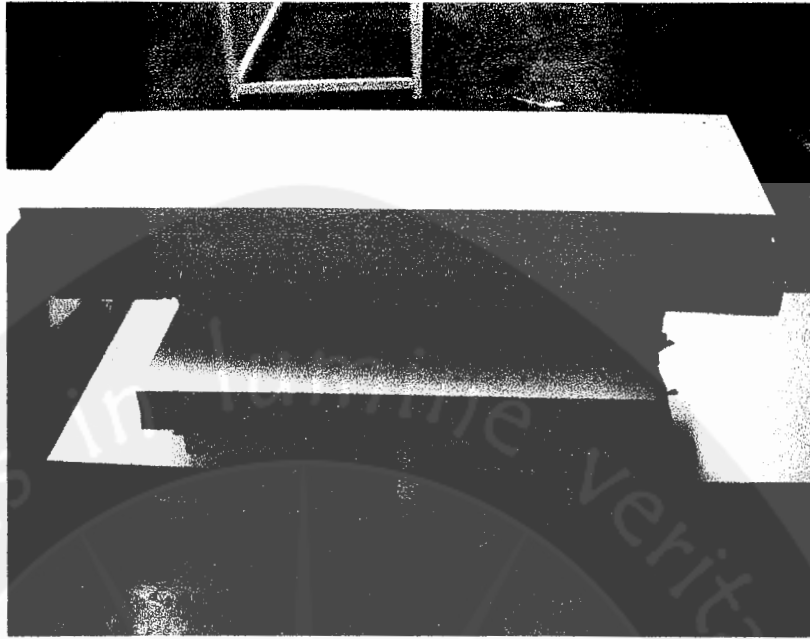
Montgomery, Douglas C., 2005, *Introduction to Statistical Quality Control*, fifth edition, John Wiley & Sons, Inc., New Jersey.

Nuraini, Anita, 2005, *Analysis on Quality Control System of Reinforcement Rocker-Outer Left Handed (Y 2021) in Stamping Production Division of P.T. Mekar Armada Jaya Magelang*, Yogyakarta.

Wibisono, Agustino, 2005, *Penerapan Acceptance Sampling Plan di Divisi Pre Delivery Control Ice Can (Studi Kasus di P.T. Esstar Indorim - Tegal)*, Yogyakarta.



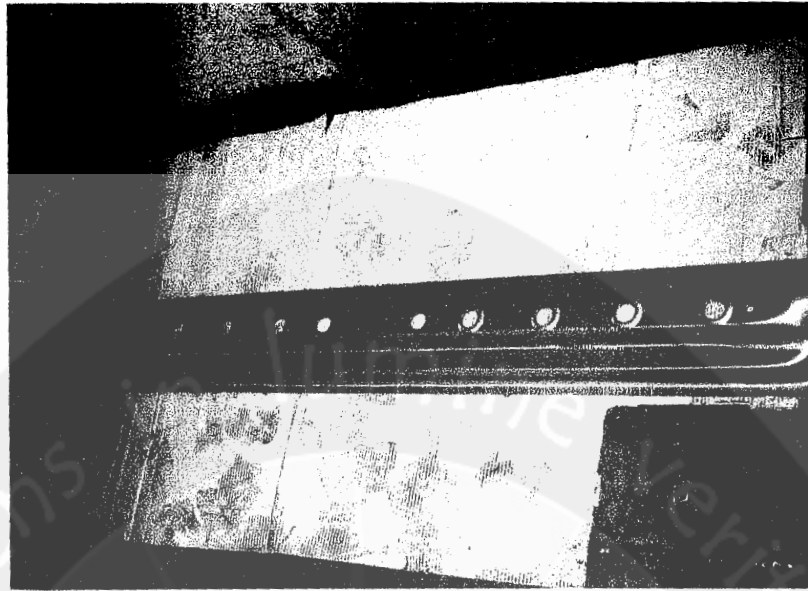
APPENDIX 1
PICTURES OF THE RAW MATERIAL
AND THE PRODUCT



Appendix 1A. The Picture of Raw Material



Appendix 1B. The Picture of Drawn Product



Appendix 1C. The Picture of Trimmed-Pierce Product



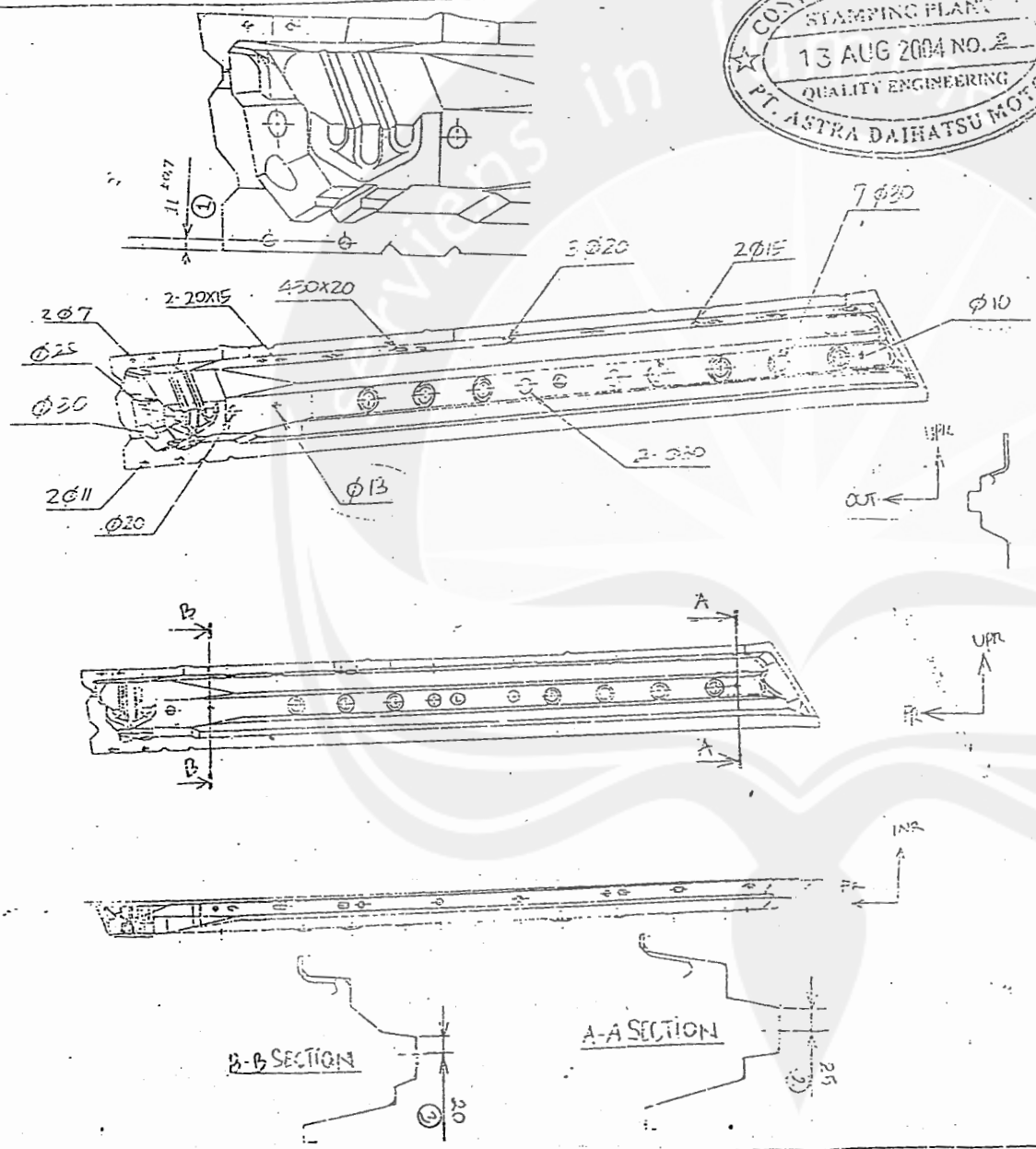
Appendix 1D. The Picture of Ready for Delivery Product



APPENDIX 2
TECHNICAL DRAWING OF THE
PRODUCT

NEA.

PART INSPECTION STANDARD

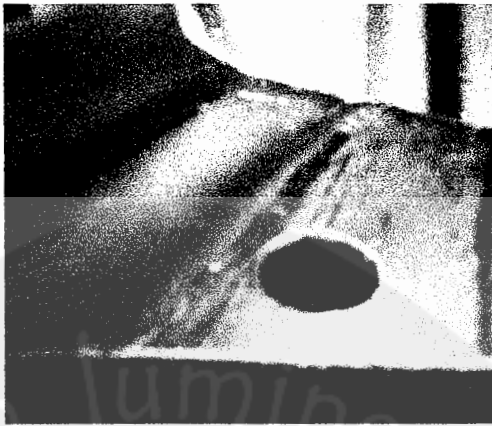


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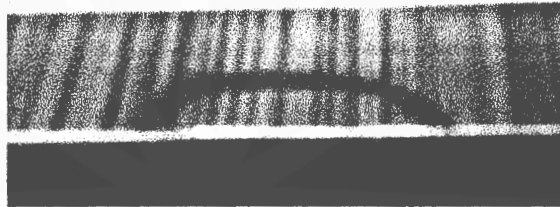
PART IDENTIFICATION	JOB NO : 72021	PART NO : 6142A-0200A				
	PART NAME : R/r, POCOR, OXIK L	TYPE : 7 SERIES				
	SPEC MATERIAL : spc 45	THICKNESS : 1,2				
	MEASURED BY : <input checked="" type="checkbox"/> MANUAL <input type="checkbox"/> DISPECT. GAUGE <input checked="" type="checkbox"/> SAMPLE PART					
STANDARD APPEARANCE	Symbols Limit Tolerance of Appearance					
	NO	DEFECT TYPE	STD	ZONE A	ZONE B	ZONE C
	1	GELOMBANG	Mulus			
	2	KERIPUT	Tak Boleh			
	3	PECOK	Tak Boleh			
	4	PECAH/RETAK	Tak Boleh			
	5	BINTIK/SENJOL	Tak Boleh			
6	BARET	Tak Boleh				
7	BURR	Tak Boleh	Tidak melebihi 0,3 mm			
Remarks :						
<ul style="list-style-type: none"> ⊕ = Sesuai Standard ★ = Gelombang karena des diizinkan ★★ = Baret halus tidak teraba jika karena des diizinkan bila L ≤ 100 mm ★★★ = Baret halus tidak teraba jika karena des diizinkan bila L ≤ 100 mm ⊙ = Pecok / berpi ringan karena des diizinkan △ = Defect boleh diperbaiki 						
STANDARD DIMENSI	JUMLAH HOLE	20 BUAH.				
	NO	STANDARD	TOL.	ALAT UKUR		
	1	11	± 0.7	CALIPER/STEEL RULE		
	2	25	± 0.7	4		
3	20	± 0.7	4			
REVISION RECORD	△					
	△					
	△					
	△					
	△					
MAPY	REVISION RECORD	BASE ON EST NO.	DATE	REV.		
APPROVAL	PT. ASTRA DAIHATSU MOTOR STAMPING PLANT	Issue Date : 03	Month : 12	Year : '03		
		Approved :	Checked :	Prepared :		



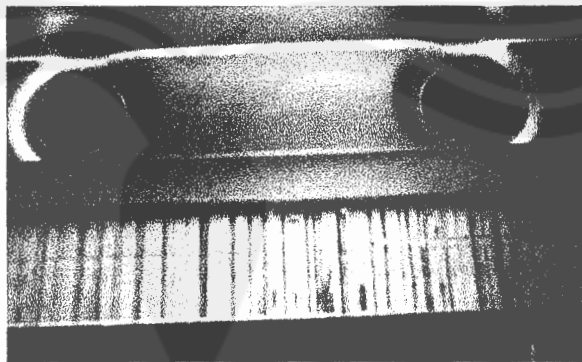
APPENDIX 3
PICTURES OF PRODUCT'S DEFECT



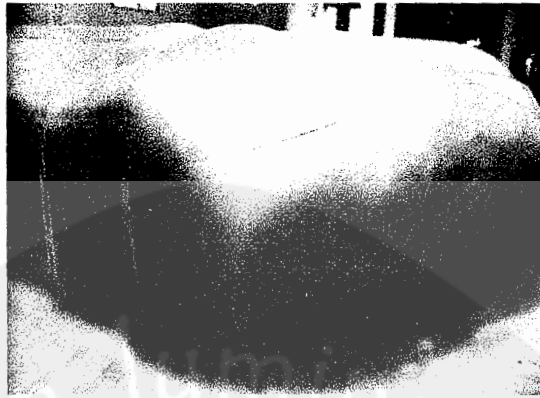
Appendix 3A. Picture of Hole Burry



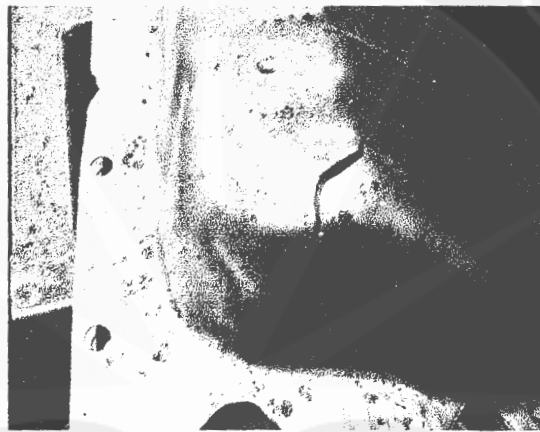
Appendix 3B. Picture of Plate Burry



Appendix 3C. Picture of Scratched Product



Appendix 3D. Picture of Neck Defect



Appendix 3E. Picture of Cracked Product



Appendix 3F. Picture of Wrinkle Defect

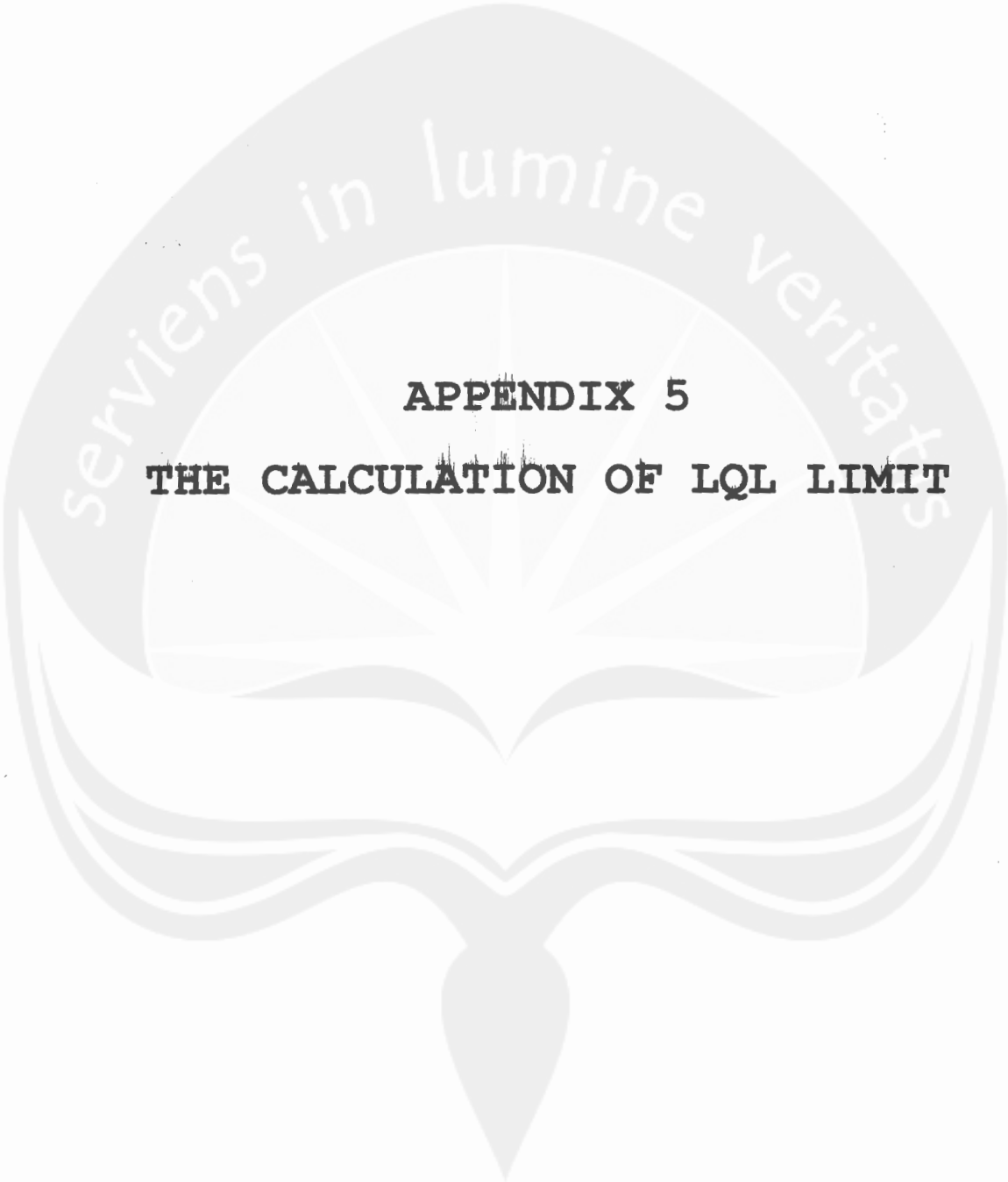


APPENDIX 4
THE GRUBB'S TABLE

TABLE 10-5 Values of np for a Producer's Risk of .05 and a Consumer's Risk of .10

Acceptance Number, c	$P_a = .95$ np_1	$P_a = .10$ np_2	np_2/np_1
0	0.051	2.303	44.84
1	0.355	3.890	10.96
2	0.818	5.322	6.51
3	1.366	6.681	4.89
4	1.970	7.994	4.06
5	2.613	9.274	3.55
6	3.286	10.532	3.21
7	3.981	11.771	2.96
8	4.695	12.995	2.77
9	5.426	14.206	2.62
10	6.169	15.407	2.50
11	6.924	16.598	2.40
12	7.690	17.782	2.31
13	8.464	18.958	2.24
14	9.246	20.128	2.18
15	10.035	21.292	2.21

Source: F. E. Grubbs (1949), "On Designing Single Sampling Plans," *Annals of Mathematical Statistics*, XX, 256. Reprinted by permission of the Institute of Mathematical Statistics.



APPENDIX 5
THE CALCULATION OF LQL LIMIT

SAMPLE SIZE FOR LQL = 4.5%

AQL 0.01
P-RISK 5%

LQL 4.5
C-RISK 10%

A 0.05
AQL 0.01
B 0.1
LQL 0.045

ANSWER

P2/P1 ratic LQL/AQL
4.5

P-STIPULAT.

c = 3
np1 = 1.366
n1 = 136.6

c = 4
np3 = 1.97
n3 = 197

Result
S. Size 137 --> SCREENING
Accept 3

C-STIPULAT.

c = 3
np2 = 6.681
n2 = 148.4667

c = 4
np4 = 7.994
n4 = 177.6444

C acc numb	Pa = 0.95	Pa = 0.1	ratio
	np1	np2	np2/np1
0	0.051	2.303	45.16
1	0.355	3.890	10.96
2	0.818	5.322	6.51
3	1.366	6.681	4.89
4	1.970	7.994	4.06
5	2.613	9.274	3.55
6	3.286	10.532	3.21
7	3.981	11.771	2.96
8	4.695	12.995	2.77
9	5.426	14.206	2.62
10	6.169	15.407	2.50
11	6.924	16.598	2.40
12	7.690	17.782	2.31
13	8.464	18.958	2.24
14	9.246	20.128	2.18
15	10.035	21.292	2.12

SAMPLE SIZE FOR LQL = 4.75%

AQL 0.01
P-RISK 5%

LQL 4.75
C-RISK 10%

A 0.05
AQL 0.01
B 0.1
LQL 0.0475

ANSWER

P2/P1 ratic LQL/AQL
4.75

P-STIPULAT.

c = 3
np1 = 1.366
n1 = 136.6

c = 4
np3 = 1.97
n3 = 197

Result
S. Size 137 --> SCREENING
Accept 3

C-STIPULAT.

c = 3
np2 = 6.681
n2 = 140.6526

c = 4
np4 = 7.994
n4 = 168.2947

C acc numb	Pa = 0.95	Pa = 0.1	ratio np2/np1
	np1	np2	
0	0.051	2.303	45.16
1	0.355	3.890	10.96
2	0.818	5.322	6.51
3	1.366	6.681	4.89
4	1.970	7.994	4.06
5	2.613	9.274	3.55
6	3.286	10.532	3.21
7	3.981	11.771	2.96
8	4.695	12.995	2.77
9	5.426	14.206	2.62
10	6.169	15.407	2.50
11	6.924	16.598	2.40
12	7.690	17.782	2.31
13	8.464	18.958	2.24
14	9.246	20.128	2.18
15	10.035	21.292	2.12

SAMPLE SIZE FOR LQL = 4.89%

AQL 0.01
P-RISK 5%

LQL 4.89
C-RISK 10%

A 0.05
AQL 0.01
B 0.1
LQL 0.0489

ANSWER

P2/P1 ratic LQL/AQL
4.89

P-STIPULAT.

c = 3
np1 = 1.366
n1 = 136.6

C-STIPULAT.

c = 3
np2 = 6.681
n2 = 136.6258

C	Pa = 0.95	Pa = 0.1	ratio
acc numb	np1	np2	np2/np1
0	0.051	2.303	45.16
1	0.355	3.890	10.96
2	0.818	5.322	6.51
3	1.366	6.681	4.89
4	1.970	7.994	4.06
5	2.613	9.274	3.55
6	3.286	10.532	3.21
7	3.981	11.771	2.96
8	4.695	12.995	2.77
9	5.426	14.206	2.62
10	6.169	15.407	2.50
11	6.924	16.598	2.40
12	7.690	17.782	2.31
13	8.464	18.958	2.24
14	9.246	20.128	2.18
15	10.035	21.292	2.12

Result
S. Size 137 --> SCREENING
Accept 3

SAMPLE SIZE FOR LQL = 4.9%

AQL 0.01
P-RISK 5%

LQL 4.9
C-RISK 10%

A 0.05
AQL 0.01
B 0.1
LQL 0.049

ANSWER

P2/P1 ratic LQL/AQL
4.9

P-STIPULAT.

c = 2
np1 = 0.818
n1 = 81.8

c = 3
np3 = 1.366
n3 = 136.6

Result
S. Size 82
Accept 2

C-STIPULAT.

c = 2
np2 = 5.322
n2 = 108.6122

c = 3
np4 = 6.681
n4 = 136.3469

C acc numb	Pa = 0.95	Pa = 0.1	ratio
	np1	np2	np2/np1
0	0.051	2.303	45.16
1	0.355	3.890	10.96
2	0.818	5.322	6.51
3	1.366	6.681	4.89
4	1.970	7.994	4.06
5	2.613	9.274	3.55
6	3.286	10.532	3.21
7	3.981	11.771	2.96
8	4.695	12.995	2.77
9	5.426	14.206	2.62
10	6.169	15.407	2.50
11	6.924	16.598	2.40
12	7.690	17.782	2.31
13	8.464	18.958	2.24
14	9.246	20.128	2.18
15	10.035	21.292	2.12

SAMPLE SIZE FOR LQL = 4.93%

AQL 0.01
P-RISK 5%

LQL 4.93
C-RISK 10%

A 0.05
AQL 0.01
B 0.1
LQL 0.0493

ANSWER

P2/P1 ratic LQL/AQL
4.93

P-STIPULAT.

c = 2
np1 = 0.818
n1 = 81.8

c = 3
np3 = 1.366
n3 = 136.6

Result
S. Size 82
Accept 2

C-STIPULAT.

c = 2
np2 = 5.322
n2 = 107.9513

c = 3
np4 = 6.681
n4 = 135.5172

C acc numb	Pa = 0.95	Pa = 0.1	ratio np2/np1
	np1	np2	
0	0.051	2.303	45.16
1	0.355	3.890	10.96
2	0.818	5.322	6.51
3	1.366	6.681	4.89
4	1.970	7.994	4.06
5	2.613	9.274	3.55
6	3.286	10.532	3.21
7	3.981	11.771	2.96
8	4.695	12.995	2.77
9	5.426	14.206	2.62
10	6.169	15.407	2.50
11	6.924	16.598	2.40
12	7.690	17.782	2.31
13	8.464	18.958	2.24
14	9.246	20.128	2.18
15	10.035	21.292	2.12

SAMPLE SIZE FOR LQL = 4.95%

AQL 0.01
P-RISK 5%

LQL 4.95
C-RISK 10%

A 0.05
AQL 0.01
B 0.1
LQL 0.0495

ANSWER

P2/P1 ratic LQL/AQL
4.95

P-STIPULAT.

c = 2
np1 = 0.818
n1 = 81.8

c = 3
np3 = 1.366
n3 = 136.6

Result
S. Size 82
Accept 2

C-STIPULAT.

c = 2
np2 = 5.322
n2 = 107.5152

c = 3
np4 = 6.681
n4 = 134.9697

C acc numb	Pa = 0.95	Pa = 0.1	ratio
	np1	np2	np2/np1
0	0.051	2.303	45.16
1	0.355	3.890	10.96
2	0.818	5.322	6.51
3	1.366	6.681	4.89
4	1.970	7.994	4.06
5	2.613	9.274	3.55
6	3.286	10.532	3.21
7	3.981	11.771	2.96
8	4.695	12.995	2.77
9	5.426	14.206	2.62
10	6.169	15.407	2.50
11	6.924	16.598	2.40
12	7.690	17.782	2.31
13	8.464	18.958	2.24
14	9.246	20.128	2.18
15	10.035	21.292	2.12

SAMPLE SIZE FOR LQL = 4.99%

AQL 0.01
 P-RISK 5%

A 0.05
 AQL 0.01
 B 0.1
 LQL 0.0499

LQL 4.99
 C-RISK 10%

ANSWER

P2/P1 ratic LQL/AQL
 4.99

P-STIPULAT.

c = 2
 np1 = 0.818
 n1 = 81.8

c = 3
 np3 = 1.366
 n3 = 136.6

C-STIPULAT.

c = 2
 np2 = 5.322
 n2 = 106.6533

c = 3
 np4 = 6.681
 n4 = 133.8878

C acc numb	Pa = 0.95	Pa = 0.1	ratio
	np1	np2	np2/np1
0	0.051	2.303	45.16
1	0.355	3.890	10.96
2	0.818	5.322	6.51
3	1.366	6.681	4.89
4	1.970	7.994	4.06
5	2.613	9.274	3.55
6	3.286	10.532	3.21
7	3.981	11.771	2.96
8	4.695	12.995	2.77
9	5.426	14.206	2.62
10	6.169	15.407	2.50
11	6.924	16.598	2.40
12	7.690	17.782	2.31
13	8.464	18.958	2.24
14	9.246	20.128	2.18
15	10.035	21.292	2.12

Result
 S. Size 82
 Accept 2

SAMPLE SIZE FOR LQL = 5%

AQL 0.01
P-RISK 5%

LQL 0.05
C-RISK 10%

A 0.05
AQL 0.01
B 0.1
LQL 0.05

ANSWER

P2/P1 ratic LQL/AQL
5

P-STIPULAT.

c = 2
np1 = 0.818
n1 = 81.8

c = 3
np3 = 1.366
n3 = 136.6

Result
S. Size 82
Accept 2

C-STIPULAT.

c = 2
np2 = 5.322
n2 = 106.44

c = 3
np4 = 6.681
n4 = 133.62

C acc numb	Pa = 0.95	Pa = 0.1	ratio
	np1	np2	np2/np1
0	0.051	2.303	45.16
1	0.355	3.890	10.96
2	0.818	5.322	6.51
3	1.366	6.681	4.89
4	1.970	7.994	4.06
5	2.613	9.274	3.55
6	3.286	10.532	3.21
7	3.981	11.771	2.96
8	4.695	12.995	2.77
9	5.426	14.206	2.62
10	6.169	15.407	2.50
11	6.924	16.598	2.40
12	7.690	17.782	2.31
13	8.464	18.958	2.24
14	9.246	20.128	2.18
15	10.035	21.292	2.12

SAMPLE SIZE FOR LQL = 6%

AQL 0.01
P-RISK 5%

A 0.05
AQL 0.01
B 0.1
LQL 0.06

LQL 0.06
C-RISK 10%

C acc numb	Pa = 0.95	Pa = 0.1	ratio
	np1	np2	np2/np1
0	0.051	2.303	45.16
1	0.355	3.890	10.96
2	0.818	5.322	6.51
3	1.366	6.681	4.89
4	1.970	7.994	4.06
5	2.613	9.274	3.55
6	3.286	10.532	3.21
7	3.981	11.771	2.96
8	4.695	12.995	2.77
9	5.426	14.206	2.62
10	6.169	15.407	2.50
11	6.924	16.598	2.40
12	7.690	17.782	2.31
13	8.464	18.958	2.24
14	9.246	20.128	2.18
15	10.035	21.292	2.12

ANSWER

P2/P1 ratic LQL/AQL
6

P-STIPULAT.

c = 2
np1 = 0.818
n1 = 81.8

c = 3
np3 = 1.366
n3 = 136.6

C-STIPULAT.

c = 2
np2 = 5.322
n2 = 88.7

c = 3
np4 = 6.681
n4 = 111.35

Result
S. Size 82
Accept 2

SAMPLE SIZE FOR LQL = 6.3%

AQL 0.01
P-RISK 5%

LQL 0.063
C-RISK 10%

A 0.05
AQL 0.01
B 0.1
LQL 0.063

ANSWER

P2/P1 ratic LQL/AQL
6.3

P-STIPULAT.

c = 2
np1 = 0.818
n1 = 81.8

c = 3
np3 = 1.366
n3 = 136.6

Result
S. Size 82
Accept 2

C-STIPULAT.

c = 2
np2 = 5.322
n2 = 84.47619

c = 3
np4 = 6.681
n4 = 106.0476

C acc numb	Pa = 0.95	Pa = 0.1	ratio
	np1	np2	np2/np1
0	0.051	2.303	45.16
1	0.355	3.890	10.96
2	0.818	5.322	6.51
3	1.366	6.681	4.89
4	1.970	7.994	4.06
5	2.613	9.274	3.55
6	3.286	10.532	3.21
7	3.981	11.771	2.96
8	4.695	12.995	2.77
9	5.426	14.206	2.62
10	6.169	15.407	2.50
11	6.924	16.598	2.40
12	7.690	17.782	2.31
13	8.464	18.958	2.24
14	9.246	20.128	2.18
15	10.035	21.292	2.12

SAMPLE SIZE FOR LQL = 6.5%

AQL 0.01
P-RISK 5%

LQL 0.065
C-RISK 10%

A 0.05
AQL 0.01
B 0.1
LQL 0.065

ANSWER

P2/P1 ratic LQL/AQL
6.5

P-STIPULAT.

c = 2
np1 = 0.818
n1 = 81.8

c = 3
np3 = 1.366
n3 = 136.6

Result
S. Size 82
Accept 2

C-STIPULAT.

c = 2
np2 = 5.322
n2 = 81.87692

c = 3
np4 = 6.681
n4 = 102.7846

C acc numb	Pa = 0.95	Pa = 0.1	ratio np2/np1
	np1	np2	
0	0.051	2.303	45.16
1	0.355	3.890	10.96
2	0.818	5.322	6.51
3	1.366	6.681	4.89
4	1.970	7.994	4.06
5	2.613	9.274	3.55
6	3.236	10.532	3.21
7	3.981	11.771	2.96
8	4.695	12.995	2.77
9	5.426	14.206	2.62
10	6.169	15.407	2.50
11	6.924	16.598	2.40
12	7.690	17.782	2.31
13	8.464	18.958	2.24
14	9.246	20.128	2.18
15	10.035	21.292	2.12

SAMPLE SIZE FOR LQL = 6.51%

AQL 0.01
 P-RISK 5%

 A 0.05
 AQL 0.01
 B 0.1
 LQL 0.0651

LQL 0.0651
 C-RISK 10%

ANSWER

P2/P1 ratic LQL/AQL
 6.51

P-STIPULAT.

c = 2
 np1 = 0.818
 n1 = 81.8

C-STIPULAT.

c = 2
 np2 = 5.322
 n2 = 81.75115

C acc numb	Pa = 0.95	Pa = 0.1	ratio
	np1	np2	np2/np1
0	0.051	2.303	45.16
1	0.355	3.890	10.96
2	0.818	5.322	6.51
3	1.366	6.681	4.89
4	1.970	7.994	4.06
5	2.613	9.274	3.55
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13	8.464	18.958	2.24
14	9.246	20.128	2.18
15	10.035	21.292	2.12

Result
 S. Size 82
 Accept 2

SAMPLE SIZE FOR LQL = 6.52%

AQL 0.01
 P-RISK 5%

A 0.05
 AQL 0.01
 B 0.1
 LQL 0.0652

LQL 0.0652
 C-RISK 10%

ANSWER

P2/P1 ratic LQL/AQL
 6.52

P-STIPULAT.

c = 1
 np1 = 0.355
 n1 = 35.5

c = 2
 np3 = 0.818
 n3 = 81.8

Result
 S. Size 36
 Accept 1

C-STIPULAT.

c = 1
 np2 = 3.89
 n2 = 59.66258

c = 2
 np4 = 5.322
 n4 = 81.62577

C acc numb	Pa = 0.95	Pa = 0.1	ratio
	np1	np2	np2/np1
0	0.051	2.303	45.16
1	0.355	3.890	10.96
2	0.818	5.322	6.51
3	1.366	6.681	4.89
4	1.970	7.994	4.06
5	2.613	9.274	3.55
6	3.286	10.532	3.21
7	3.981	11.771	2.96
8	4.695	12.995	2.77
9	5.426	14.206	2.62
10	6.169	15.407	2.50
11	6.924	16.598	2.40
12	7.690	17.782	2.31
13	8.464	18.958	2.24
14	9.246	20.128	2.18
15	10.035	21.292	2.12

SAMPLE SIZE FOR LQL = 6.6%

AQL 0.01
 P-RISK 5%

A 0.05
 AQL 0.01
 B 0.1
 LQL 0.066

LQL 0.066
 C-RISK 10%

ANSWER

P2/P1 ratic LQL/AQL
 6.6

P-STIPULAT.

c = 1
 np1 = 0.355
 n1 = 35.5

c = 2
 np3 = 0.818
 n3 = 81.8

Result
 S. Size 36
 Accept 1

C-STIPULAT.

c = 1
 np2 = 3.89
 n2 = 58.93939

c = 2
 np4 = 5.322
 n4 = 80.63636

C acc numb	Pa = 0.95	Pa = 0.1	ratio
	np1	np2	np2/np1
0	0.051	2.303	45.16
1	0.355	3.890	10.96
2	0.818	5.322	6.51
3	1.366	6.681	4.89
4	1.970	7.994	4.06
5	2.613	9.274	3.55
6	3.286	10.532	3.21
7	3.981	11.771	2.96
8	4.695	12.995	2.77
9	5.426	14.206	2.62
10	6.169	15.407	2.50
11	6.924	16.598	2.40
12	7.690	17.782	2.31
13	8.464	18.958	2.24
14	9.246	20.128	2.18
15	10.035	21.292	2.12