

รายการอ้างอิง



ภาษาไทย

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แบบหลายโรงผสม วิทยานิพนธ์ ปริญญาโท ภาควิชาวิศวกรรมอุตสาหกรรม
บัณฑิตวิทยาลัย , จุฬาลงกรณ์มหาวิทยาลัย , พ.ศ. 2536

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พ.ศ. 2533

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ประเทศไทย วิทยานิพนธ์ ปริญญาโท ภาควิชาวิศวกรรมอุตสาหกรรม
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สำเร็จรูป , วิทยานิพนธ์ ปริญญาโท ภาควิชาการบัญชี บัณฑิตวิทยาลัย
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พ.ศ. 2528

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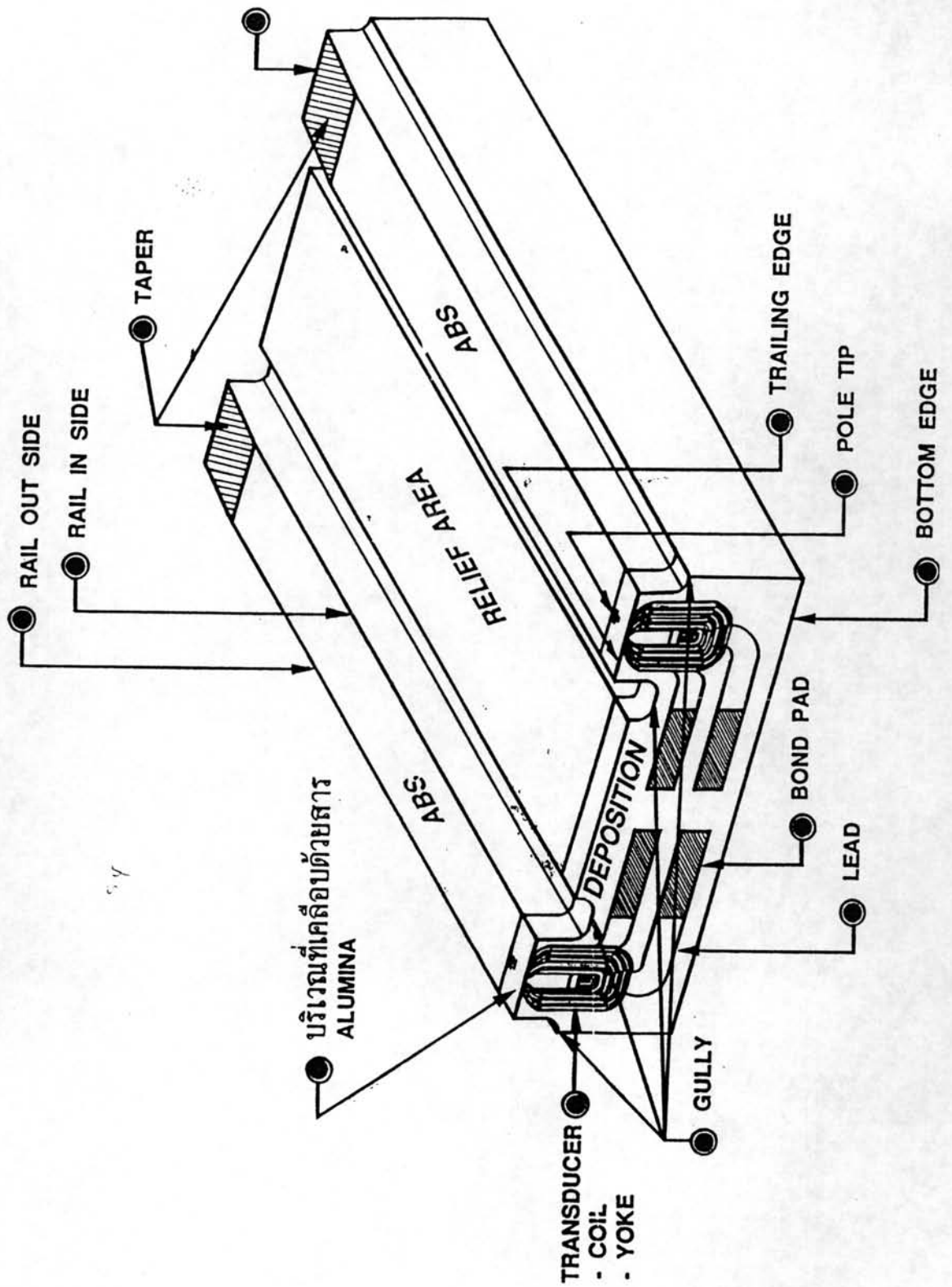
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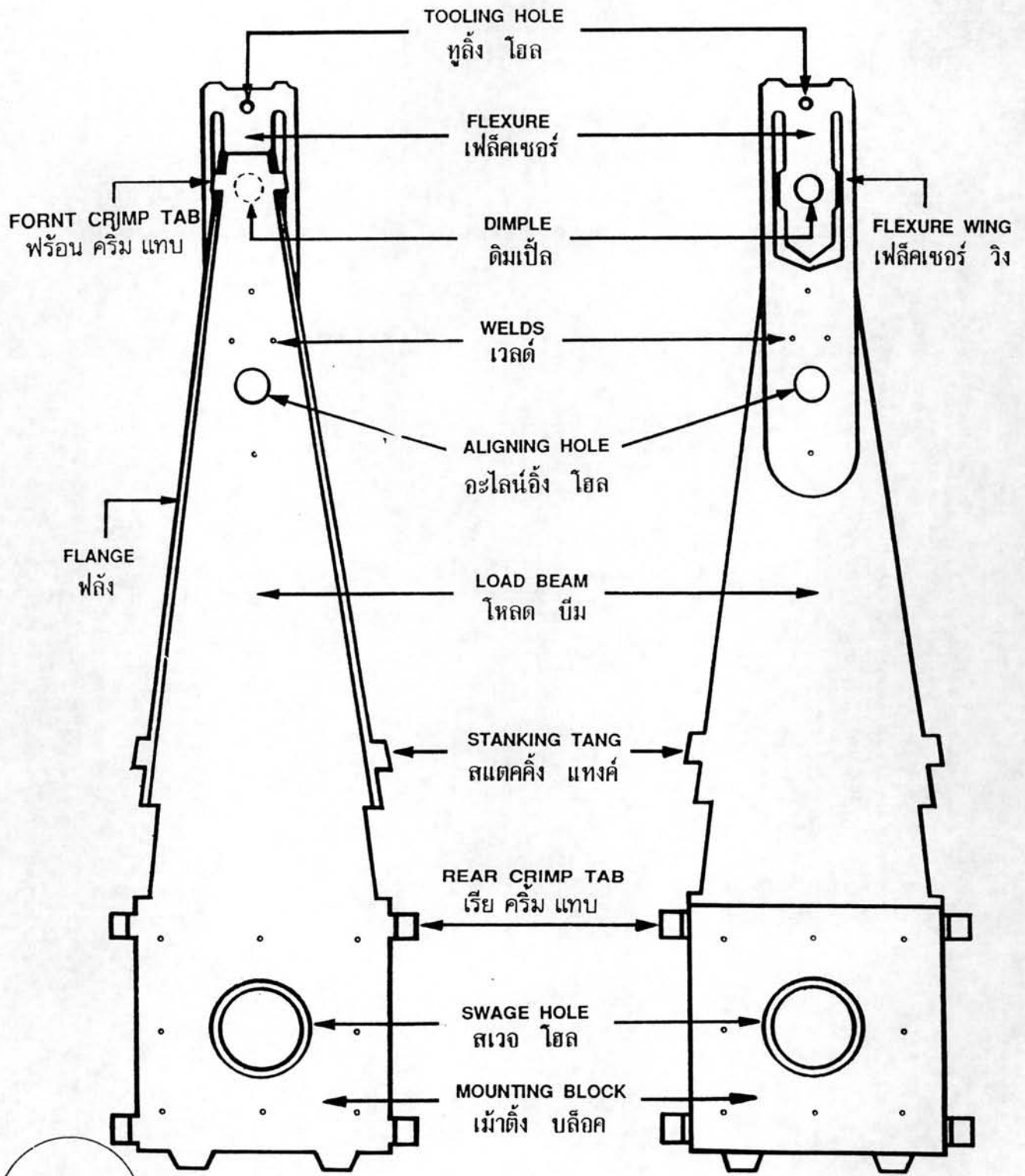
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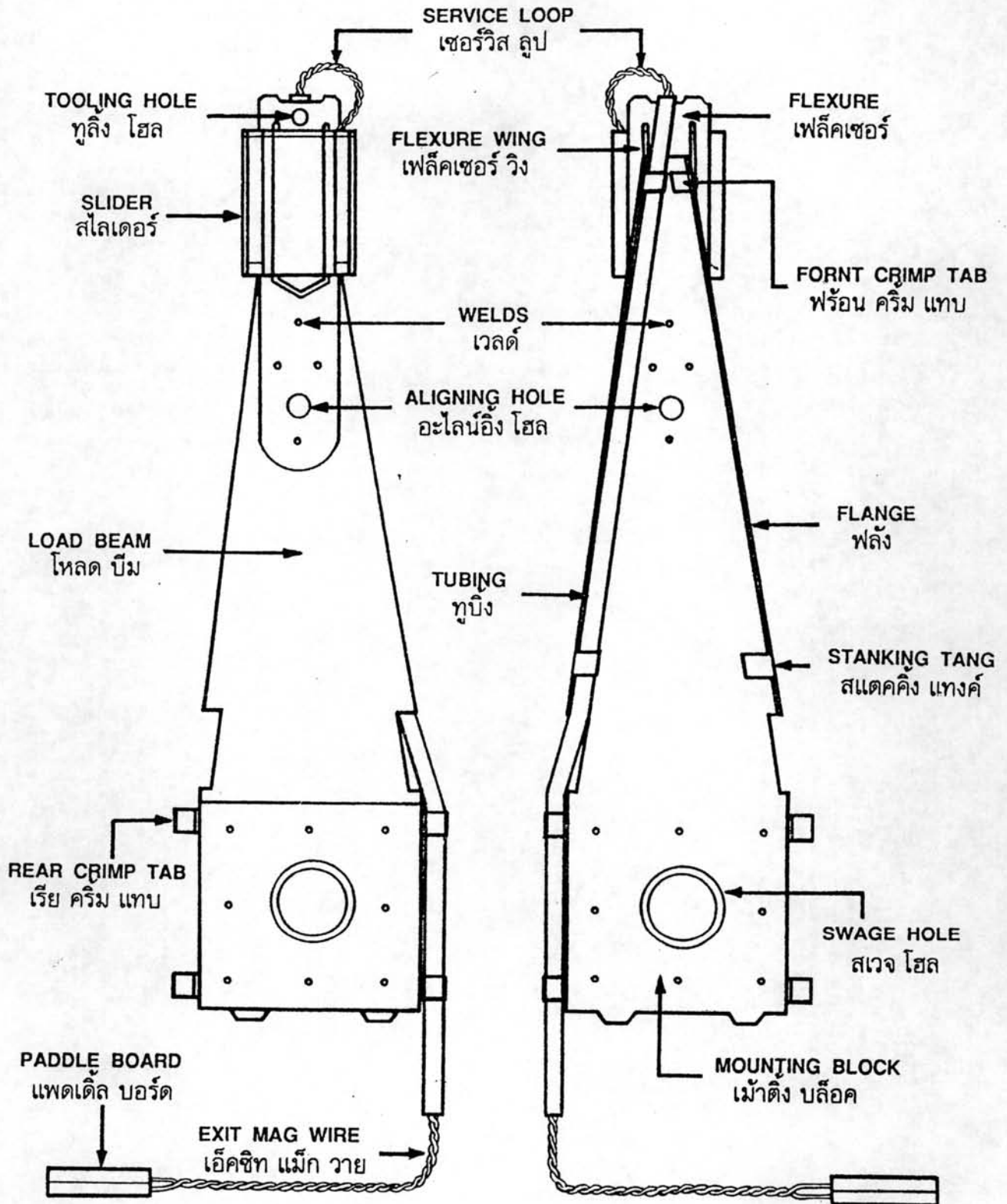
ภาคผนวก



ภาพที่ 1 สไลเดอร์ (Slider)



ภาพที่ 2 ซัสเพนชั่น (Suspension)



ภาพที่ 3 หัวอ่านและบันทึกสัญญาณแม่เหล็ก (Head Gimble Assembly)

Factor 1/d2 for converting average range into standard deviation

		A									
		1	2	3	4	5	8	10	>10		
B	2	0.709	0.781	0.813	0.862	0.840	0.855	0.862	0.862	0.885	
	3	0.524	0.552	0.565	0.571	0.575	0.581	0.581	0.581	0.592	
	4	0.446	0.465	0.472	0.474	0.476	0.481	0.481	0.481	0.485	
	5	0.403	0.417	0.420	0.422	0.424	0.426	0.426	0.427	0.429	
	6	0.375	0.385	0.388	0.389	0.391	0.392	0.392	0.392	0.370	
	7	0.353	0.361	0.364	0.365	0.366	0.368	0.368	0.368	0.370	
	8	0.388	0.344	0.346	0.347	0.348	0.348	0.348	0.350	0.351	
	9	0.325	0.331	0.332	0.333	0.334	0.334	0.334	0.336	0.337	
	10	0.314	0.319	0.322	0.323	0.323	0.324	0.324	0.324	0.325	

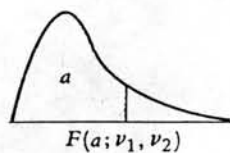
Note : Base on d2 factors in A.J. Duncan , Quality Control and Industrial Statistics , 1965 ,
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Table A Area under the normal curve
 Proportion of the total area of the standard normal curve from $-\infty$ to z (z represents a normalized statistic)

z	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01	0.00
-3.5	0.00017	0.00017	0.00018	0.00019	0.00019	0.00020	0.00021	0.00022	0.00022	0.00023
-3.4	0.00024	0.00025	0.00026	0.00027	0.00028	0.00029	0.00030	0.00031	0.00033	0.00034
-3.3	0.00035	0.00036	0.00038	0.00039	0.00040	0.00042	0.00043	0.00045	0.00047	0.00048
-3.2	0.00050	0.00052	0.00054	0.00056	0.00058	0.00060	0.00062	0.00064	0.00066	0.00069
-3.1	0.00071	0.00074	0.00076	0.00079	0.00082	0.00085	0.00087	0.00090	0.00094	0.00097
-3.0	0.00100	0.00104	0.00107	0.00111	0.00114	0.00118	0.00122	0.00126	0.00131	0.00135
-2.9	0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017	0.0018	0.0019
-2.8	0.0019	0.0020	0.0021	0.0021	0.0022	0.0023	0.0023	0.0024	0.0025	0.0026
-2.7	0.0026	0.0027	0.0028	0.0029	0.0030	0.0031	0.0032	0.0033	0.0034	0.0035
-2.6	0.0036	0.0037	0.0038	0.0039	0.0040	0.0041	0.0043	0.0044	0.0045	0.0047
-2.5	0.0048	0.0049	0.0051	0.0052	0.0054	0.0055	0.0057	0.0059	0.0060	0.0062
-2.4	0.0064	0.0066	0.0068	0.0069	0.0071	0.0073	0.0075	0.0078	0.0080	0.0082
-2.3	0.0084	0.0087	0.0089	0.0091	0.0094	0.0096	0.0099	0.0102	0.0104	0.0107
-2.2	0.0110	0.0113	0.0116	0.0119	0.0122	0.0125	0.0129	0.0132	0.0136	0.0139
-2.1	0.0143	0.0146	0.0150	0.0154	0.0158	0.0162	0.0166	0.0170	0.0174	0.0179
-2.0	0.0183	0.0188	0.0192	0.0197	0.0202	0.0207	0.0212	0.0217	0.0222	0.0228
-1.9	0.0233	0.0239	0.0244	0.0250	0.0256	0.0262	0.0268	0.0274	0.0281	0.0287
-1.8	0.0294	0.0301	0.0307	0.0314	0.0322	0.0329	0.0336	0.0344	0.0351	0.0359
1.7	0.0367	0.0375	0.0384	0.0392	0.0401	0.0409	0.0418	0.0427	0.0436	0.0446
1.6	0.0455	0.0465	0.0475	0.0485	0.0495	0.0505	0.0516	0.0526	0.0537	0.0548
1.5	0.0559	0.0571	0.0582	0.0594	0.0606	0.0618	0.0630	0.0643	0.0655	0.0668
-1.4	0.0681	0.0694	0.0708	0.0721	0.0735	0.0749	0.0764	0.0778	0.0793	0.0808
-1.3	0.0823	0.0838	0.0853	0.0869	0.0885	0.0901	0.0918	0.0934	0.0951	0.0968
-1.2	0.0985	0.1003	0.1020	0.1038	0.1057	0.1075	0.1093	0.1112	0.1131	0.1151
-1.1	0.1170	0.1190	0.1210	0.1230	0.1251	0.1271	0.1292	0.1314	0.1335	0.1357
-1.0	0.1379	0.1401	0.1423	0.1446	0.1469	0.1492	0.1515	0.1539	0.1562	0.1587
-0.9	0.1611	0.1635	0.1660	0.1685	0.1711	0.1736	0.1762	0.1788	0.1814	0.1841
-0.8	0.1867	0.1894	0.1922	0.1949	0.1977	0.2005	0.2033	0.2061	0.2090	0.2119
-0.7	0.2148	0.2177	0.2207	0.2236	0.2266	0.2297	0.2327	0.2358	0.2389	0.2420
-0.6	0.2451	0.2483	0.2514	0.2546	0.2578	0.2611	0.2643	0.2676	0.2709	0.2743
-0.5	0.2776	0.2810	0.2843	0.2877	0.2912	0.2946	0.2981	0.3015	0.3050	0.3085
-0.4	0.3121	0.3156	0.3192	0.3228	0.3264	0.3300	0.3336	0.3372	0.3409	0.3446
-0.3	0.3483	0.3520	0.3557	0.3594	0.3632	0.3669	0.3707	0.3745	0.3783	0.3821
-0.2	0.3859	0.3897	0.3936	0.3974	0.4013	0.4052	0.4090	0.4129	0.4168	0.4207
-0.1	0.4247	0.4286	0.4325	0.4364	0.4404	0.4443	0.4483	0.4522	0.4562	0.4602
-0.0	0.4641	0.4681	0.4721	0.4761	0.4801	0.4840	0.4880	0.4920	0.4960	0.5000

Table A (continued)

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
+0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
+0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
+0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
+0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
+0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
+0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
+0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
+0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
+0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8079	0.8106	0.8133
+0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
+1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
+1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
+1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
+1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
+1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
+1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
+1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
+1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
+1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
+1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
+2.0	0.9773	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
+2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
+2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
+2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
+2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
+2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
+2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
+2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
+2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
+2.9	0.9981	0.9982	0.9983	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
+3.0	0.99865	0.99869	0.99874	0.99878	0.99882	0.99886	0.99889	0.99893	0.99896	0.99900
+3.1	0.99903	0.99906	0.99910	0.99913	0.99915	0.99918	0.99921	0.99924	0.99926	0.99929
+3.2	0.99931	0.99934	0.99936	0.99938	0.99940	0.99942	0.99944	0.99946	0.99948	0.99950
+3.3	0.99952	0.99953	0.99955	0.99957	0.99958	0.99960	0.99961	0.99962	0.99964	0.99965
+3.4	0.99966	0.99967	0.99969	0.99970	0.99971	0.99972	0.99973	0.99974	0.99975	0.99976
+3.5	0.99977	0.99978	0.99978	0.99979	0.99980	0.99981	0.99981	0.99982	0.99983	0.99983



$$a = .95$$

denominator <i>df</i>	numerator <i>df</i>								
	1	2	3	4	5	6	7	8	9
1	161.4	199.5	215.7	224.6	230.2	234.0	236.8	238.9	240.5
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28
26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04
120	3.92	3.07	2.68	2.45	2.29	2.17	2.09	2.02	1.96
∞	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88

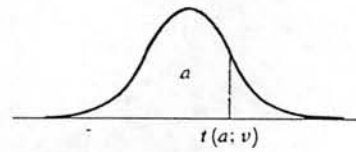
$$\alpha = .95$$

numerator <i>df</i>										denominator <i>df</i>
10	12	15	20	24	30	40	60	120	∞	
241.9	243.9	245.9	248.0	249.1	250.1	251.1	252.2	253.3	254.3	1
19.40	19.41	19.43	19.45	19.45	19.46	19.47	19.48	19.49	19.50	2
8.79	8.74	8.70	8.66	8.64	8.62	8.59	8.57	8.55	8.53	3
5.96	5.91	5.86	5.80	5.77	5.75	5.72	5.69	5.66	5.63	4
4.74	4.68	4.62	4.56	4.53	4.50	4.46	4.43	4.40	4.36	5
4.06	4.00	3.94	3.87	3.84	3.81	3.77	3.74	3.70	3.67	6
3.64	3.57	3.51	3.44	3.41	3.38	3.34	3.30	3.27	3.23	7
3.35	3.28	3.22	3.15	3.12	3.08	3.04	3.01	2.97	2.93	8
3.14	3.07	3.01	2.94	2.90	2.86	2.83	2.79	2.75	2.71	9
2.98	2.91	2.85	2.77	2.74	2.70	2.66	2.62	2.58	2.54	10
2.85	2.79	2.72	2.65	2.61	2.57	2.53	2.49	2.45	2.40	11
2.75	2.69	2.62	2.54	2.51	2.47	2.43	2.38	2.34	2.30	12
2.67	2.60	2.53	2.46	2.42	2.38	2.34	2.30	2.25	2.21	13
2.60	2.53	2.46	2.39	2.35	2.31	2.27	2.22	2.18	2.13	14
2.54	2.48	2.40	2.33	2.29	2.25	2.20	2.16	2.11	2.07	15
2.49	2.42	2.35	2.28	2.24	2.19	2.15	2.11	2.06	2.01	16
2.45	2.38	2.31	2.23	2.19	2.15	2.10	2.06	2.01	1.96	17
2.41	2.34	2.27	2.19	2.15	2.11	2.06	2.02	1.97	1.92	18
2.38	2.31	2.23	2.16	2.11	2.07	2.03	1.98	1.93	1.88	19
2.35	2.28	2.20	2.12	2.08	2.04	1.99	1.95	1.90	1.84	20
2.32	2.25	2.18	2.10	2.05	2.01	1.96	1.92	1.87	1.81	21
2.30	2.23	2.15	2.07	2.03	1.98	1.94	1.89	1.84	1.78	22
2.27	2.20	2.13	2.05	2.01	1.96	1.91	1.86	1.81	1.76	23
2.25	2.18	2.11	2.03	1.98	1.94	1.89	1.84	1.79	1.73	24
2.24	2.16	2.09	2.01	1.96	1.92	1.87	1.82	1.77	1.71	25
2.22	2.15	2.07	1.99	1.95	1.90	1.85	1.80	1.75	1.69	26
2.20	2.13	2.06	1.97	1.93	1.88	1.84	1.79	1.73	1.67	27
2.19	2.12	2.04	1.96	1.91	1.87	1.82	1.77	1.71	1.65	28
2.18	2.10	2.03	1.94	1.90	1.85	1.81	1.75	1.70	1.64	29
2.16	2.09	2.01	1.93	1.89	1.84	1.79	1.74	1.68	1.62	30
2.08	2.00	1.92	1.84	1.79	1.74	1.69	1.64	1.58	1.51	40
1.99	1.92	1.84	1.75	1.70	1.65	1.59	1.53	1.47	1.39	60
1.91	1.83	1.75	1.66	1.61	1.55	1.50	1.43	1.35	1.25	120
1.83	1.75	1.67	1.57	1.52	1.46	1.39	1.32	1.22	1.00	∞

ตารางที่ 3.2 F - Distribution

$$a = .99$$

denominator <i>df</i>	numerator <i>df</i>								
	1	2	3	4	5	6	7	8	9
1	4052	4999.5	5403	5625	5764	5859	5928	5981	6022
2	98.50	99.00	99.17	99.25	99.30	99.33	99.36	99.37	99.39
3	34.12	30.82	29.46	28.71	28.24	27.91	27.67	27.49	27.35
4	21.20	18.00	16.69	15.98	15.52	15.21	14.98	14.80	14.66
5	16.26	13.27	12.06	11.39	10.97	10.67	10.46	10.29	10.16
6	13.75	10.92	9.78	9.15	8.75	8.47	8.26	8.10	7.98
7	12.25	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72
8	11.26	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91
9	10.56	8.02	6.99	6.42	6.06	5.80	5.61	5.47	5.35
10	10.04	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.94
11	9.65	7.21	6.22	5.67	5.32	5.07	4.89	4.74	4.63
12	9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.39
13	9.07	6.70	5.74	5.21	4.86	4.62	4.44	4.30	4.19
14	8.86	6.51	5.56	5.04	4.69	4.46	4.28	4.14	4.03
15	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4.00	3.89
16	8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.78
17	8.40	6.11	5.18	4.67	4.34	4.10	3.93	3.79	3.68
18	8.29	6.01	5.09	4.58	4.25	4.01	3.84	3.71	3.60
19	8.18	5.93	5.01	4.50	4.17	3.94	3.77	3.63	3.52
20	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.46
21	8.02	5.78	4.87	4.37	4.04	3.81	3.64	3.51	3.40
22	7.95	5.72	4.82	4.31	3.99	3.76	3.59	3.45	3.35
23	7.88	5.66	4.76	4.26	3.94	3.71	3.54	3.41	3.30
24	7.82	5.61	4.72	4.22	3.90	3.67	3.50	3.36	3.26
25	7.77	5.57	4.68	4.18	3.85	3.63	3.46	3.32	3.22
26	7.72	5.53	4.64	4.14	3.82	3.59	3.42	3.29	3.18
27	7.68	5.49	4.60	4.11	3.78	3.56	3.39	3.26	3.15
28	7.64	5.45	4.57	4.07	3.75	3.53	3.36	3.23	3.12
29	7.60	5.42	4.54	4.04	3.73	3.50	3.33	3.20	3.09
30	7.56	5.39	4.51	4.02	3.70	3.47	3.30	3.17	3.07
40	7.31	5.18	4.31	3.83	3.51	3.29	3.12	2.99	2.89
60	7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82	2.72
120	6.85	4.79	3.95	3.48	3.17	2.96	2.79	2.66	2.56
∞	6.63	4.61	3.78	3.32	3.02	2.80	2.64	2.51	2.41



df v	a						
	.75	.90	.95	.975	.99	.995	.9995
1	1.000	3.078	6.314	12.706	31.821	63.657	636.619
2	0.816	1.886	2.920	4.303	6.965	9.925	31.599
3	0.765	1.638	2.353	3.182	4.541	5.841	12.924
4	0.741	1.533	2.132	2.776	3.747	4.604	8.110
5	0.727	1.476	2.015	2.571	3.365	4.032	6.869
6	0.718	1.440	1.943	2.447	3.143	3.707	5.959
7	0.711	1.415	1.895	2.365	2.998	3.499	5.408
8	0.706	1.397	1.860	2.306	2.896	3.355	5.041
9	0.703	1.383	1.833	2.262	2.821	3.250	4.781
10	0.700	1.372	1.812	2.228	2.764	3.169	4.587
11	0.697	1.363	1.796	2.201	2.718	3.106	4.437
12	0.695	1.356	1.782	2.179	2.681	3.055	4.318
13	0.694	1.350	1.771	2.160	2.650	3.012	4.221
14	0.692	1.345	1.761	2.145	2.624	2.977	4.140
15	0.691	1.341	1.753	2.131	2.602	2.947	4.073
16	0.690	1.337	1.746	2.120	2.583	2.921	4.015
17	0.689	1.333	1.740	2.110	2.567	2.898	3.965
18	0.688	1.330	1.734	2.101	2.552	2.878	3.922
19	0.688	1.328	1.729	2.093	2.539	2.861	3.883
20	0.687	1.325	1.725	2.086	2.528	2.845	3.850
21	0.686	1.323	1.721	2.080	2.518	2.831	3.819
22	0.686	1.321	1.717	2.074	2.508	2.819	3.792
23	0.685	1.319	1.714	2.069	2.500	2.807	3.768
24	0.685	1.318	1.711	2.064	2.492	2.797	3.745
25	0.684	1.316	1.708	2.060	2.485	2.787	3.725
26	0.684	1.315	1.706	2.056	2.479	2.779	3.707
27	0.684	1.314	1.703	2.052	2.473	2.771	3.690
28	0.683	1.313	1.701	2.048	2.467	2.763	3.674
29	0.683	1.311	1.699	2.045	2.462	2.756	3.659
30	0.683	1.310	1.697	2.042	2.457	2.750	3.646
40	0.681	1.303	1.684	2.021	2.423	2.704	3.551
60	0.679	1.296	1.671	2.000	2.390	2.660	3.460
120	0.677	1.289	1.658	1.980	2.358	2.617	3.373
∞	0.674	1.282	1.645	1.960	2.326	2.576	3.291

EXAMPLE: $t(0.95; 10) = 1.812$ so $P\{t(10) \leq 1.812\} = 0.95$.

TEXT REFERENCE: Use of this table is discussed on p. 939.

Factors for determining from Rbar the 3 sigma control limit for Xbar - R charts.

Number of observations in subgroup	Factor for Xbar chart	Factor for R chart.	
		LCL	UCL
n	A2	D3	D4
2	1.88	0.00	3.27
3	1.02	0.00	2.57
4	0.73	0.00	2.28
5	0.58	0.00	2.11
6	0.48	0.00	2.00
7	0.42	0.08	1.92
8	0.37	0.14	1.86
9	0.34	0.18	1.82
10	0.31	0.22	1.78
11	0.29	0.26	1.74
12	0.27	0.28	1.72
13	0.25	0.31	1.69
14	0.24	0.33	1.67
15	0.22	0.35	1.65
16	0.21	0.36	1.64
17	0.20	0.38	1.62
18	0.19	0.39	1.61
19	0.19	0.40	1.60
20	0.18	0.41	1.59

ตารางที่ 5 ค่าคงที่สำหรับ Xbar-R Chart

Table E Factors for determining from \bar{s} and $\bar{\sigma}_{RMS}$ the 3-sigma control limits for \bar{X} and s or σ_{RMS} charts

Number of observations in subgroup, n	Factor for \bar{X} chart using $\bar{\sigma}_{RMS}$, A_1	Factor for \bar{X} chart using \bar{s} , A_3	Factors for s or σ_{RMS} charts	
			Lower control limit B_3	Upper control limit B_4
2	3.76	2.66	0	3.27
3	2.39	1.95	0	2.57
4	1.88	1.63	0	2.27
5	1.60	1.43	0	2.09
6	1.41	1.29	0.03	1.97
7	1.28	1.18	0.12	1.88
8	1.17	1.10	0.19	1.81
9	1.09	1.03	0.24	1.76
10	1.03	0.98	0.28	1.72
11	0.97	0.93	0.32	1.68
12	0.93	0.89	0.35	1.65
13	0.88	0.85	0.38	1.62
14	0.85	0.82	0.41	1.59
15	0.82	0.79	0.43	1.57
16	0.79	0.76	0.45	1.55
17	0.76	0.74	0.47	1.53
18	0.74	0.72	0.48	1.52
19	0.72	0.70	0.50	1.50
20	0.70	0.68	0.51	1.49
21	0.68	0.66	0.52	1.48
22	0.66	0.65	0.53	1.47
23	0.65	0.63	0.54	1.46
24	0.63	0.62	0.55	1.45
25	0.62	0.61	0.56	1.44
30	0.56	0.55	0.60	1.40
35	0.52	0.51	0.63	1.37
40	0.48	0.48	0.66	1.34
45	0.45	0.45	0.68	1.32
50	0.43	0.43	0.70	1.30
55	0.41	0.41	0.71	1.29
60	0.39	0.39	0.72	1.28
65	0.38	0.37	0.73	1.27
70	0.36	0.36	0.74	1.26
75	0.35	0.35	0.75	1.25
80	0.34	0.34	0.76	1.24
85	0.33	0.33	0.77	1.23
90	0.32	0.32	0.77	1.23
95	0.31	0.31	0.78	1.22
100	0.30	0.30	0.79	1.21

ตารางที่ 6 ค่าคงที่สำหรับ Xbar - S Chart

n	2	3	4	5	6	7	8	9	10
D4	3.27	2.57	2.28	2.11	2	1.92	1.86	1.82	1.78
D3						0.08	0.14	0.18	0.22
E2	2.66	1.77	1.46	1.29	1.18	1.11	1.05	1.01	0.98

$$UCL\ MR = D4 * Rbar$$

$$UCL - X = Xbar + E2 * Rbar$$

$$LCL\ MR = D3 * Rbar$$

$$LCL - X = Xbar - E2 * Rbar$$

ตารางที่ 7 ค่าคงที่สำหรับ X-MR Chart

Inspection Accuracy Worksheet

Part Name	AAA
Part No.	AAA
Characteristic.	X1
Instruction No. / Rev.	XXX
Date	Oct-94

Appraiser	Name	Saisunee				
		Sample	Truth (C/N)	Trial 1	Trial 2	Trial 3
No.1	C	C	C	C	C	C
No.2	C	N	N	C	C	N
No.3	N	N	N	N	N	N
No.4	C	C	C	C	C	C
No.5	N	N	N	N	N	N
No.6	C	C	C	C	C	C
No.7	C	C	C	C	C	C
No.8	C	C	N	C	C	N
No.9	N	N	N	N	N	N
No.10	N	N	C	C	C	N
No.11	C	C	C	C	C	N
No.12	N	N	N	N	N	N
No.13	C	C	C	C	C	C
No.14	N	C	C	C	N	C
No.15	C	C	C	C	C	C
No.16	N	N	N	N	N	N
No.17	N	C	C	N	N	C
No.18	N	N	N	N	N	N
No.19	C	C	C	C	C	C
No.20	N	C	C	N	N	N
No.21	C	C	C	C	C	C
No.22	N	N	N	N	N	N
No.23	N	C	C	C	C	N
No.24	C	N	N	C	C	C

C : Conforming
N : Nonconforming

Inspection Accuracy Calculation Worksheet

Part Name
Part No.
Characteristic.
Instruction No. / Rev.
Date

AAA
AAA
X1
XXX
Oct-94

Results						
Appraiser	C correct	N correct	Total Correct	False alarm	Miss	Grand total
Saisunee	52	44	96	8	16	120
Wilai	50	54	104	10	6	120
Srirung	57	42	99	3	18	120
Sontaya	42	45	87	18	15	120
Vipaporn	56	52	108	4	8	120
Pikul	57	49	106	3	11	120
Anong	47	58	105	13	2	120
Phatthani	49	52	101	11	8	120
Rachanee	45	59	104	15	1	120
Supaporn	53	44	97	7	16	120
Total	508	499	1007	92	101	1200

Calculation					
Appraiser	E	P(FA)	P(Miss)	B	Remark
Saisunee	80.00%	13.33%	26.67%	0.6362	
Wilai	86.67%	16.67%	10.00%		
Srirung	82.50%	5.00%	30.00%		
Sontaya	72.50%	30.00%	25.00%		
Vipaporn	90.00%	6.67%	13.33%		
Pikul	88.33%	5.00%	18.33%		
Anong	87.50%	21.67%	3.33%		
Phatthani	84.17%	18.33%	13.33%		
Rachanee	86.67%	25.00%	1.67%		
Supaporn	80.83%	11.67%	26.67%		
Total	83.92%	15.33%	16.83%		

Table of Random Number (1- 24)

No. of parts	Set 1	Set 2	Set 3	Set 4	Set 5	Set 6	Set 7	Set 8	Set 9	Set 10
#1	18	3	12	24	21	3	21	2	12	4
#2	12	11	14	14	10	22	5	22	20	1
#3	20	2	15	19	15	19	16	10	22	16
#4	24	6	9	20	5	5	20	14	4	5
#5	15	10	3	13	3	18	6	15	8	14
#6	8	23	6	12	24	21	2	5	6	20
#7	16	15	23	3	18	20	14	23	11	12
#8	5	21	4	11	9	1	17	12	18	24
#9	23	14	1	1	13	12	10	13	7	13
#10	14	12	10	17	2	16	8	18	9	18
#11	19	1	5	23	11	11	7	17	10	8
#12	2	19	19	4	23	7	1	9	2	2
#13	3	16	20	22	1	6	9	20	21	15
#14	22	7	7	8	19	15	24	3	24	9
#15	7	22	11	15	17	9	19	16	16	23
#16	21	4	22	16	4	8	12	19	5	17
#17	11	8	8	6	12	24	3	8	19	11
#18	10	24	18	7	16	14	11	11	15	6
#19	13	13	2	21	22	17	13	6	13	7
#20	6	5	21	18	20	23	4	4	3	10
#21	1	17	13	2	7	2	18	7	17	3
#22	17	20	17	9	8	4	15	21	23	21
#23	4	9	24	5	6	13	22	24	14	22
#24	9	18	16	10	14	10	23	1	1	19

Table of Sample Size - Attribute Data

Quantity of Appraisers,	Min NO. of parts	Min NO. of inspection per parts
1	24	5
2	18	4
3 or more	12	3

ตารางที่ 11 จำนวนตัวอย่างที่เหมาะสมสำหรับ Attribute Data

Table of Bias Factors.

P(FA) or P(Miss)	B(FA) or B(Miss)	P(FA) or P(Miss)	B(FA) or B(Miss)
0.01	0.0264	0.26	0.3251
0.02	0.0488	0.27	0.3312
0.03	0.0681	0.28	0.3372
0.04	0.0863	0.29	0.3429
0.05	0.1040	0.30	0.3485
0.06	0.1200	0.31	0.3538
0.07	0.1334	0.32	0.3572
0.08	0.1497	0.33	0.3621
0.09	0.1626	0.34	0.3668
0.10	0.1758	0.35	0.3712
0.11	0.1872	0.36	0.3739
0.12	0.1989	0.37	0.3778
0.13	0.2107	0.38	0.3814
0.14	0.2227	0.39	0.3836
0.15	0.2323	0.40	0.3867
0.16	0.2444	0.41	0.3885
0.17	0.2541	0.42	0.3910
0.18	0.2631	0.43	0.3925
0.19	0.2709	0.44	0.3945
0.20	0.2803	0.45	0.3961
0.21	0.2874	0.46	0.3970
0.22	0.2966	0.47	0.3977
0.23	0.3034	0.48	0.3984
0.24	0.3101	0.49	0.3989
0.25	0.3187	0.50	0.3989

Table of Attribute Data Criteria

Parameter	Acceptable	Marginal	Unacceptable
E	0.9 or more	0.8 to 0.9	less than 0.8
P(FA)	0.05 or less	0.05 to 0.10	more than 0.10
P(Miss)	0.05 or less	0.05 to 0.10	more than 0.10
B	0.8 to 1.2	0.5 to 0.8 or 1.2 to 1.5	less than 0.5 or more than 1.5

Special case for B value

P(FA)	P(Miss)	B	Decision
0	More than 0	No value	Use E,P(FA),P(Miss) directly
More than 0	0	No value	Use E,P(FA),P(Miss) directly
0	0	No value	Acceptable

ตารางที่ 13 ตารางค่ายอมรับได้ของการวิเคราะห์ความถูกต้องของการตรวจสอบ

Product and process quality checklist

Process : ABS inspection

Question	Yes	No	Remark
1. Are there sufficient personnel identified to cover :			
1.1 Control plan requirements.		#	
1.2 Engineering performance testing.	#		
1.3 Problem resolution analysis.		#	
2. Is there a documented training program that :			
2.1 Includes all employees?	#		
2.2 Lists those who have been trained?	#		
2.3 Provides a training schedule?	#		
3. Has training been completed for :			
3.1 Statistical process control?	#		
3.2 Process capability study?	#		
3.3 Problem solving?		#	
4. Is each operation provided with process instructions that are keyed to the control plan?	#		
5. Are standard operator instructions available at each operation?	#		
6. Were operator/team leaders involved in developing standard operator instructions?	#		
7. Do inspection instructions include :			
7.1 Easily understood engineering performance specifications?	#		
7.2 Test frequencies?	#		
7.3 Sample sizes?	#		
7.4 Reaction plan?		#	
7.5 Documentations?	#		
8. Are visual aids :			
8.1 Easily understood?	#		
8.2 Available?	#		
8.3 Accessible?	#		
8.4 Approved?	#		
8.5 Dated and current?	#		
9. Is there a procedure to implement , maintain and establish reaction plan for statistical control chart?		#	

Product and process quality checklist

Process : ABS inspection

Question	Yes	No	Remark
10. Is there an effective root cause analysis in place?		#	
11. Have provisions been made to place the latest drawings and specifications at the point of inspection?	#		
12. Are forms/logs available for appropriate personnel to record inspection results?	#		
13. Have provisions been made to place the following at the monitored operations :			
13.1 Inspection gages?	#		
13.2 Gage instructions?	#		
13.3 Reference samples?	#		
13.4 Inspection logs?	#		
14. Have provisions been made to certify and routinely calibrate gages and test equipments?	#		
15. Have required measurement system capability studies been :			
15.1 Completed?		#	
15.2 Acceptable?		#	
16. Is there a procedure to identify , segregate and control nonconforming products to prevent shipment?	#		
17. Are rework/repair procedures available?	#		
18. Is there a procedure to requalify , repaired/reworked material?	#		
19. Is there an appropriate lot traceability system?	#		
20. Are periodic audits of product/process planned and implemented?	#		
Reference : Advance Product Quality Planning and Control , Russell Jacobs , Radley Smith and Dan Reid , 1994.			

Product and process quality checklist

Process : Depo inspection

Question	Yes	No	Remark
1. Are there sufficient personnel identified to cover :			
1.1 Control plan requirements.		#	
1.2 Engineering performance testing.	#		
1.3 Problem resolution analysis.		#	
2. Is there a documented training program that :			
2.1 Includes all employees?	#		
2.2 Lists those who have been trained?	#		
2.3 Provides a training schedule?	#		
3. Has training been completed for :			
3.1 Statistical process control?	#		
3.2 Process capability study?	#		
3.3 Problem solving?		#	
4. Is each operation provided with process instructions that are keyed to the control plan?	#		
5. Are standard operator instructions available at each operation?	#		
6. Were operator/team leaders involved in developing standard operator instructions?	#		
7. Do inspection instructions include :			
7.1 Easily understood engineering performance specifications?	#		
7.2 Test frequencies?	#		
7.3 Sample sizes?	#		
7.4 Reaction plan?		#	
7.5 Documentations?	#		
8. Are visual aids :			
8.1 Easily understood?	#		
8.2 Available?	#		
8.3 Accessible?	#		
8.4 Approved?	#		
8.5 Dated and current?	#		
9. Is there a procedure to implement , maintain and establish reaction plan for statistical control chart?		#	



Product and process quality checklist

Process : Depo inspection

Question	Yes	No	Remark
10. Is there an effective root cause analysis in place?		#	
11. Have provisions been made to place the latest drawings and specifications at the point of inspection?	#		
12. Are forms/logs available for appropriate personnel to record inspection results?	#		
13. Have provisions been made to place the following at the monitored operations :			
13.1 Inspection gages?	#		
13.2 Gage instructions?	#		
13.3 Reference samples?	#		
13.4 Inspection logs?	#		
14. Have provisions been made to certify and routinely calibrate gages and test equipments?	#		
15. Have required measurement system capability studies been :			
15.1 Completed?		#	
15.2 Acceptable?		#	
16. Is there a procedure to identify , segregate and control nonconforming products to prevent shipment?	#		
17. Are rework/repair procedures available?	#		
18. Is there a procedure to requalify , repaired/reworked material?	#		
19. Is there an appropriate lot traceability system?	#		
20. Are periodic audits of product/process planned and implemented?	#		
Reference : Advance Product Quality Planning and Control , Russell Jacobs , Radley Smith and Dan Reid , 1994.			

Product and process quality checklist

Process : Wire Bond

Question	Yes	No	Remark
1. Are there sufficient personnel identified to cover :			
1.1 Control plan requirements.		#	
1.2 Engineering performance testing.	#		
1.3 Problem resolution analysis.		#	
2. Is there a documented training program that :			
2.1 Includes all employees?	#		
2.2 Lists those who have been trained?	#		
2.3 Provides a training schedule?	#		
3. Has training been completed for :			
3.1 Statistical process control?	#		
3.2 Process capability study?	#		
3.3 Problem solving?		#	
4. Is each operation provided with process instructions that are keyed to the control plan?	#		
5. Are standard operator instructions available at each operation?	#		
6. Were operator/team leaders involved in developing standard operator instructions?	#		
7. Do inspection instructions include :			
7.1 Easily understood engineering performance specifications?	#		
7.2 Test frequencies?	#		
7.3 Sample sizes?	#		
7.4 Reaction plan?		#	
7.5 Documentations?	#		
8. Are visual aids :			
8.1 Easily understood?	#		
8.2 Available?	#		
8.3 Accessible?	#		
8.4 Approved?	#		
8.5 Dated and current?	#		
9. Is there a procedure to implement , maintain and establish reaction plan for statistical control chart?		#	

Product and process quality checklist

Process : Wire Bond

Question	Yes	No	Remark
10. Is there an effective root cause analysis in place?		#	
11. Have provisions been made to place the latest drawings and specifications at the point of inspection?	#		
12. Are forms/logs available for appropriate personnel to record inspection results?	#		
13. Have provisions been made to place the following at the monitored operations :			
13.1 Inspection gages?	#		
13.2 Gage instructions?	#		
13.3 Reference samples?	#		
13.4 Inspection logs?	#		
14. Have provisions been made to certify and routinely calibrate gages and test equipments?	#		
15. Have required measurement system capability studies been :			
15.1 Completed?		#	
15.2 Acceptable?		#	
16. Is there a procedure to identify , segregate and control nonconforming products to prevent shipment?	#		
17. Are rework/repair procedures available?	#		
18. Is there a procedure to requalify , repaired/reworked material?	#		
19. Is there an appropriate lot traceability system?	#		
20. Are periodic audits of product/process planned and implemented?	#		
Reference : Advance Product Quality Planning and Control ,			
Russell Jacobs , Radley Smith and Dan Reid , 1994.			

Product and process quality checklist

Process : Wire Pull Test

Question	Yes	No	Remark
1. Are there sufficient personnel identified to cover :			
1.1 Control plan requirements.		#	
1.2 Engineering performance testing.	#		
1.3 Problem resolution analysis.		#	
2. Is there a documented training program that :			
2.1 Includes all employees?	#		
2.2 Lists those who have been trained?	#		
2.3 Provides a training schedule?	#		
3. Has training been completed for :			
3.1 Statistical process control?	#		
3.2 Process capability study?	#		
3.3 Problem solving?		#	
4. Is each operation provided with process instructions that are keyed to the control plan?	#		
5. Are standard operator instructions available at each operation?	#		
6. Were operator/team leaders involved in developing standard operator instructions?	#		
7. Do inspection instructions include :			
7.1 Easily understood engineering performance specifications?	#		
7.2 Test frequencies?	#		
7.3 Sample sizes?	#		
7.4 Reaction plan?		#	
7.5 Documentations?	#		
8. Are visual aids :			
8.1 Easily understood?	#		
8.2 Available?	#		
8.3 Accessible?	#		
8.4 Approved?	#		
8.5 Dated and current?	#		
9. Is there a procedure to implement , maintain and establish reaction plan for statistical control chart?		#	

Product and process quality checklist

Process : Wire Pull Test

Question	Yes	No	Remark
10. Is there an effective root cause analysis in place?		#	
11. Have provisions been made to place the latest drawings and specifications at the point of inspection?	#		
12. Are forms/logs available for appropriate personnel to record inspection results?	#		
13. Have provisions been made to place the following at the monitored operations :			
13.1 Inspection gages?	#		
13.2 Gage instructions?	#		
13.3 Reference samples?	#		
13.4 Inspection logs?	#		
14. Have provisions been made to certify and routinely calibrate gages and test equipments?	#		
15. Have required measurement system capability studies been :			
15.1 Completed?		#	
15.2 Acceptable?		#	
16. Is there a procedure to identify , segregate and control nonconforming products to prevent shipment?	#		
17. Are rework/repair procedures available?	#		
18. Is there a procedure to requalify , repaired/reworked material?	#		
19. Is there an appropriate lot traceability system?	#		
20. Are periodic audits of product/process planned and implemented?	#		
Reference : Advance Product Quality Planning and Control ,			
Russell Jacobs , Radley Smith and Dan Reid , 1994.			

Product and process quality checklist

Process : Conformal Coat

Question	Yes	No	Remark
1. Are there sufficient personnel identified to cover :			
1.1 Control plan requirements.		#	
1.2 Engineering performance testing.	#		
1.3 Problem resolution analysis.		#	
2. Is there a documented training program that :			
2.1 Includes all employees?	#		
2.2 Lists those who have been trained?	#		
2.3 Provides a training schedule?	#		
3. Has training been completed for :			
3.1 Statistical process control?	#		
3.2 Process capability study?	#		
3.3 Problem solving?		#	
4. Is each operation provided with process instructions that are keyed to the control plan?	#		
5. Are standard operator instructions available at each operation?	#		
6. Were operator/team leaders involved in developing standard operator instructions?	#		
7. Do inspection instructions include :			
7.1 Easily understood engineering performance specifications?	#		
7.2 Test frequencies?	#		
7.3 Sample sizes?	#		
7.4 Reaction plan?		#	
7.5 Documentations?	#		
8. Are visual aids :			
8.1 Easily understood?	#		
8.2 Available?	#		
8.3 Accessible?	#		
8.4 Approved?	#		
8.5 Dated and current?	#		
9. Is there a procedure to implement , maintain and establish reaction plan for statistical control chart?		#	

Product and process quality checklist

Process :Conformal Coat

Question	Yes	No	Remark
10. Is there an effective root cause analysis in place?		#	
11. Have provisions been made to place the latest drawings and specifications at the point of inspection?	#		
12. Are forms/logs available for appropriate personnel to record inspection results?	#		
13. Have provisions been made to place the following at the monitored operations :			
13.1 Inspection gages?	#		
13.2 Gage instructions?	#		
13.3 Reference samples?	#		
13.4 Inspection logs?	#		
14. Have provisions been made to certify and routinely calibrate gages and test equipments?	#		
15. Have required measurement system capability studies been :			
15.1 Completed?		#	
15.2 Acceptable?		#	
16. Is there a procedure to identify , segregate and control nonconforming products to prevent shipment?	#		
17. Are rework/repair procedures available?	#		
18. Is there a procedure to requalify , repaired/reworked material?	#		
19. Is there an appropriate lot traceability system?	#		
20. Are periodic audits of product/process planned and implemented?	#		
Reference : Advance Product Quality Planning and Control , Russell Jacobs , Radley Smith and Dan Reid , 1994.			

Product and process quality checklist

Process : Flex Bond

Question	Yes	No	Remark
1. Are there sufficient personnel identified to cover :			
1.1 Control plan requirements.		#	
1.2 Engineering performance testing.	#		
1.3 Problem resolution analysis.		#	
2. Is there a documented training program that :			
2.1 Includes all employees?	#		
2.2 Lists those who have been trained?	#		
2.3 Provides a training schedule?	#		
3. Has training been completed for :			
3.1 Statistical process control?	#		
3.2 Process capability study?	#		
3.3 Problem solving?		#	
4. Is each operation provided with process instructions that are keyed to the control plan?	#		
5. Are standard operator instructions available at each operation?	#		
6. Were operator/team leaders involved in developing standard operator instructions?	#		
7. Do inspection instructions include :			
7.1 Easily understood engineering performance specifications?	#		
7.2 Test frequencies?	#		
7.3 Sample sizes?	#		
7.4 Reaction plan?		#	
7.5 Documentations?	#		
8. Are visual aids :			
8.1 Easily understood?	#		
8.2 Available?	#		
8.3 Accessible?	#		
8.4 Approved?	#		
8.5 Dated and current?	#		
9. Is there a procedure to implement , maintain and establish reaction plan for statistical control chart?		#	

Product and process quality checklist

Process : Flex Bond

Question	Yes	No	Remark
10. Is there an effective root cause analysis in place?		#	
11. Have provisions been made to place the latest drawings and specifications at the point of inspection?	#		
12. Are forms/logs available for appropriate personnel to record inspection results?	#		
13. Have provisions been made to place the following at the monitored operations :			
13.1 Inspection gages?	#		
13.2 Gage instructions?	#		
13.3 Reference samples?	#		
13.4 Inspection logs?	#		
14. Have provisions been made to certify and routinely calibrate gages and test equipments?	#		
15. Have required measurement system capability studies been :			
15.1 Completed?		#	
15.2 Acceptable?		#	
16. Is there a procedure to identify , segregate and control nonconforming products to prevent shipment?	#		
17. Are rework/repair procedures available?	#		
18. Is there a procedure to requalify , repaired/reworked material?	#		
19. Is there an appropriate lot traceability system?	#		
20. Are periodic audits of product/process planned and implemented?	#		
Reference : Advance Product Quality Planning and Control ,			
Russell Jacobs , Radley Smith and Dan Reid , 1994.			

Product and process quality checklist

Process : Flex Pull Test

Question	Yes	No	Remark
1. Are there sufficient personnel identified to cover :			
1.1 Control plan requirements.		#	
1.2 Engineering performance testing.	#		
1.3 Problem resolution analysis.		#	
2. Is there a documented training program that :			
2.1 Includes all employees?	#		
2.2 Lists those who have been trained?	#		
2.3 Provides a training schedule?	#		
3. Has training been completed for :			
3.1 Statistical process control?	#		
3.2 Process capability study?	#		
3.3 Problem solving?		#	
4. Is each operation provided with process instructions that are keyed to the control plan?	#		
5. Are standard operator instructions available at each operation?	#		
6. Were operator/team leaders involved in developing standard operator instructions?	#		
7. Do inspection instructions include :			
7.1 Easily understood engineering performance specifications?	#		
7.2 Test frequencies?	#		
7.3 Sample sizes?	#		
7.4 Reaction plan?		#	
7.5 Documentations?	#		
8. Are visual aids :			
8.1 Easily understood?	#		
8.2 Available?	#		
8.3 Accessible?	#		
8.4 Approved?	#		
8.5 Dated and current?	#		
9. Is there a procedure to implement , maintain and establish reaction plan for statistical control chart?		#	

Product and process quality checklist

Process : Flex Pull Test

Question	Yes	No	Remark
10. Is there an effective root cause analysis in place?		#	
11. Have provisions been made to place the latest drawings and specifications at the point of inspection?	#		
12. Are forms/logs available for appropriate personnel to record inspection results?	#		
13. Have provisions been made to place the following at the monitored operations :			
13.1 Inspection gages?	#		
13.2 Gage instructions?	#		
13.3 Reference samples?	#		
13.4 Inspection logs?	#		
14. Have provisions been made to certify and routinely calibrate gages and test equipments?	#		
15. Have required measurement system capability studies been :			
15.1 Completed?		#	
15.2 Acceptable?		#	
16. Is there a procedure to identify , segregate and control nonconforming products to prevent shipment?	#		
17. Are rework/repair procedures available?	#		
18. Is there a procedure to requalify , repaired/reworked material?	#		
19. Is there an appropriate lot traceability system?	#		
20. Are periodic audits of product/process planned and implemented?	#		
Reference : Advance Product Quality Planning and Control , Russell Jacobs , Radley Smith and Dan Reid , 1994.			

Product and process quality checklist

Process : XY Dimension Audit.

Question	Yes	No	Remark
1. Are there sufficient personnel identified to cover :			
1.1 Control plan requirements.		#	
1.2 Engineering performance testing.	#		
1.3 Problem resolution analysis.		#	
2. Is there a documented training program that :			
2.1 Includes all employees?	#		
2.2 Lists those who have been trained?	#		
2.3 Provides a training schedule?	#		
3. Has training been completed for :			
3.1 Statistical process control?	#		
3.2 Process capability study?	#		
3.3 Problem solving?		#	
4. Is each operation provided with process instructions that are keyed to the control plan?	#		
5. Are standard operator instructions available at each operation?	#		
6. Were operator/team leaders involved in developing standard operator instructions?	#		
7. Do inspection instructions include :			
7.1 Easily understood engineering performance specifications?	#		
7.2 Test frequencies?	#		
7.3 Sample sizes?	#		
7.4 Reaction plan?		#	
7.5 Documentations?	#		
8. Are visual aids :			
8.1 Easily understood?	#		
8.2 Available?	#		
8.3 Accessible?	#		
8.4 Approved?	#		
8.5 Dated and current?	#		
9. Is there a procedure to implement , maintain and establish reaction plan for statistical control chart?		#	

Product and process quality checklist

Process : XY Dimension Audit.

Question	Yes	No	Remark
10. Is there an effective root cause analysis in place?		#	
11. Have provisions been made to place the latest drawings and specifications at the point of inspection?	#		
12. Are forms/logs available for appropriate personnel to record inspection results?	#		
13. Have provisions been made to place the following at the monitored operations :			
13.1 Inspection gages?	#		
13.2 Gage instructions?	#		
13.3 Reference samples?	#		
13.4 Inspection logs?	#		
14. Have provisions been made to certify and routinely calibrate gages and test equipments?	#		
15. Have required measurement system capability studies been :			
15.1 Completed?		#	
15.2 Acceptable?		#	
16. Is there a procedure to identify , segregate and control nonconforming products to prevent shipment?	#		
17. Are rework/repair procedures available?	#		
18. Is there a procedure to requalify , repaired/reworked material?	#		
19. Is there an appropriate lot traceability system?	#		
20. Are periodic audits of product/process planned and implemented?	#		
Reference : Advance Product Quality Planning and Control ,			
Russell Jacobs , Radley Smith and Dan Reid , 1994.			

Product and process quality checklist

Process : Staking

Question	Yes	No	Remark
1. Are there sufficient personnel identified to cover :			
1.1 Control plan requirements.		#	
1.2 Engineering performance testing.	#		
1.3 Problem resolution analysis.		#	
2. Is there a documented training program that :			
2.1 Includes all employees?	#		
2.2 Lists those who have been trained?	#		
2.3 Provides a training schedule?	#		
3. Has training been completed for :			
3.1 Statistical process control?	#		
3.2 Process capability study?	#		
3.3 Problem solving?		#	
4. Is each operation provided with process instructions that are keyed to the control plan?	#		
5. Are standard operator instructions available at each operation?	#		
6. Were operator/team leaders involved in developing standard operator instructions?	#		
7. Do inspection instructions include :			
7.1 Easily understood engineering performance specifications?	#		
7.2 Test frequencies?	#		
7.3 Sample sizes?	#		
7.4 Reaction plan?		#	
7.5 Documentations?	#		
8. Are visual aids :			
8.1 Easily understood?	#		
8.2 Available?	#		
8.3 Accessible?	#		
8.4 Approved?	#		
8.5 Dated and current?	#		
9. Is there a procedure to implement , maintain and establish reaction plan for statistical control chart?		#	

Product and process quality checklist

Process : Staking

Question	Yes	No	Remark
10. Is there an effective root cause analysis in place?		#	
11. Have provisions been made to place the latest drawings and specifications at the point of inspection?	#		
12. Are forms/logs available for appropriate personnel to record inspection results?	#		
13. Have provisions been made to place the following at the monitored operations :			
13.1 Inspection gages?	#		
13.2 Gage instructions?	#		
13.3 Reference samples?	#		
13.4 Inspection logs?	#		
14. Have provisions been made to certify and routinely calibrate gages and test equipments?	#		
15. Have required measurement system capability studies been :			
15.1 Completed?		#	
15.2 Acceptable?		#	
16. Is there a procedure to identify , segregate and control nonconforming products to prevent shipment?	#		
17. Are rework/repair procedures available?	#		
18. Is there a procedure to requalify , repaired/reworked material?	#		
19. Is there an appropriate lot traceability system?	#		
20. Are periodic audits of product/process planned and implemented?	#		
Reference : Advance Product Quality Planning and Control , Russell Jacobs , Radley Smith and Dan Reid , 1994.			

Product and process quality checklist

Process :Magnetic Test

Question	Yes	No	Remark
1. Are there sufficient personnel identified to cover :			
1.1 Control plan requirements.		#	
1.2 Engineering performance testing.	#		
1.3 Problem resolution analysis.		#	
2. Is there a documented training program that :			
2.1 Includes all employees?	#		
2.2 Lists those who have been trained?	#		
2.3 Provides a training schedule?	#		
3. Has training been completed for :			
3.1 Statistical process control?	#		
3.2 Process capability study?	#		
3.3 Problem solving?		#	
4. Is each operation provided with process instructions that are keyed to the control plan?	#		
5. Are standard operator instructions available at each operation?	#		
6. Were operator/team leaders involved in developing standard operator instructions?	#		
7. Do inspection instructions include :			
7.1 Easily understood engineering performance specifications?	#		
7.2 Test frequencies?	#		
7.3 Sample sizes?	#		
7.4 Reaction plan?		#	
7.5 Documentations?	#		
8. Are visual aids :			
8.1 Easily understood?	#		
8.2 Available?	#		
8.3 Accessible?	#		
8.4 Approved?	#		
8.5 Dated and current?	#		
9. Is there a procedure to implement , maintain and establish reaction plan for statistical control chart?		#	

Product and process quality checklist

Process : Magnetic Test

Question	Yes	No	Remark
10. Is there an effective root cause analysis in place?		#	
11. Have provisions been made to place the latest drawings and specifications at the point of inspection?	#		
12. Are forms/logs available for appropriate personnel to record inspection results?	#		
13. Have provisions been made to place the following at the monitored operations :			
13.1 Inspection gages?	#		
13.2 Gage instructions?	#		
13.3 Reference samples?	#		
13.4 Inspection logs?	#		
14. Have provisions been made to certify and routinely calibrate gages and test equipments?	#		
15. Have required measurement system capability studies been :			
15.1 Completed?		#	
15.2 Acceptable?		#	
16. Is there a procedure to identify , segregate and control nonconforming products to prevent shipment?	#		
17. Are rework/repair procedures available?	#		
18. Is there a procedure to requalify , repaired/reworked material?	#		
19. Is there an appropriate lot traceability system?	#		
20. Are periodic audits of product/process planned and implemented?	#		
Reference : Advance Product Quality Planning and Control , Russell Jacobs , Radley Smith and Dan Reid , 1994.			

Product and process quality checklist

Process : 100% High Power Inspection

Question	Yes	No	Remark
1. Are there sufficient personnel identified to cover :			
1.1 Control plan requirements.		#	
1.2 Engineering performance testing.	#		
1.3 Problem resolution analysis.		#	
2. Is there a documented training program that :			
2.1 Includes all employees?	#		
2.2 Lists those who have been trained?	#		
2.3 Provides a training schedule?	#		
3. Has training been completed for :			
3.1 Statistical process control?	#		
3.2 Process capability study?	#		
3.3 Problem solving?		#	
4. Is each operation provided with process instructions that are keyed to the control plan?	#		
5. Are standard operator instructions available at each operation?	#		
6. Were operator/team leaders involved in developing standard operator instructions?	#		
7. Do inspection instructions include :			
7.1 Easily understood engineering performance specifications?	#		
7.2 Test frequencies?	#		
7.3 Sample sizes?	#		
7.4 Reaction plan?		#	
7.5 Documentations?	#		
8. Are visual aids :			
8.1 Easily understood?	#		
8.2 Available?	#		
8.3 Accessible?	#		
8.4 Approved?	#		
8.5 Dated and current?	#		
9. Is there a procedure to implement , maintain and establish reaction plan for statistical control chart?		#	

Product and process quality checklist

Process : !00% High Power Inspection

Question	Yes	No	Remark
10. Is there an effective root cause analysis in place?		#	
11. Have provisions been made to place the latest drawings and specifications at the point of inspection?	#		
12. Are forms/logs available for appropriate personnel to record inspection results?	#		
13. Have provisions been made to place the following at the monitored operations :			
13.1 Inspection gages?	#		
13.2 Gage instructions?	#		
13.3 Reference samples?	#		
13.4 Inspection logs?	#		
14. Have provisions been made to certify and routinely calibrate gages and test equipments?	#		
15. Have required measurement system capability studies been :			
15.1 Completed?		#	
15.2 Acceptable?		#	
16. Is there a procedure to identify , segregate and control nonconforming products to prevent shipment?	#		
17. Are rework/repair procedures available?	#		
18. Is there a procedure to requalify , repaired/reworked material?	#		
19. Is there an appropriate lot traceability system?	#		
20. Are periodic audits of product/process planned and implemented?	#		
Reference : Advance Product Quality Planning and Control ,			
Russell Jacobs , Radley Smith and Dan Reid , 1994.			

Product and process quality checklist

Process : 100% Low Power Inspection

Question	Yes	No	Remark
1. Are there sufficient personnel identified to cover :			
1.1 Control plan requirements.		#	
1.2 Engineering performance testing.	#		
1.3 Problem resolution analysis.		#	
2. Is there a documented training program that :			
2.1 Includes all employees?	#		
2.2 Lists those who have been trained?	#		
2.3 Provides a training schedule?	#		
3. Has training been completed for :			
3.1 Statistical process control?	#		
3.2 Process capability study?	#		
3.3 Problem solving?		#	
4. Is each operation provided with process instructions that are keyed to the control plan?	#		
5. Are standard operator instructions available at each operation?	#		
6. Were operator/team leaders involved in developing standard operator instructions?	#		
7. Do inspection instructions include :			
7.1 Easily understood engineering performance specifications?	#		
7.2 Test frequencies?	#		
7.3 Sample sizes?	#		
7.4 Reaction plan?		#	
7.5 Documentations?	#		
8. Are visual aids :			
8.1 Easily understood?	#		
8.2 Available?	#		
8.3 Accessible?	#		
8.4 Approved?	#		
8.5 Dated and current?	#		
9. Is there a procedure to implement , maintain and establish reaction plan for statistical control chart?		#	

Product and process quality checklist

Process : 100% Low Power Inspection

Question	Yes	No	Remark
10. Is there an effective root cause analysis in place?		#	
11. Have provisions been made to place the latest drawings and specifications at the point of inspection?	#		
12. Are forms/logs available for appropriate personnel to record inspection results?	#		
13. Have provisions been made to place the following at the monitored operations :			
13.1 Inspection gages?	#		
13.2 Gage instructions?	#		
13.3 Reference samples?	#		
13.4 Inspection logs?	#		
14. Have provisions been made to certify and routinely calibrate gages and test equipments?	#		
15. Have required measurement system capability studies been :			
15.1 Completed?		#	
15.2 Acceptable?		#	
16. Is there a procedure to identify , segregate and control nonconforming products to prevent shipment?	#		
17. Are rework/repair procedures available?	#		
18. Is there a procedure to requalify , repaired/reworked material?	#		
19. Is there an appropriate lot traceability system?	#		
20. Are periodic audits of product/process planned and implemented?	#		
Reference : Advance Product Quality Planning and Control , Russell Jacobs , Radley Smith and Dan Reid , 1994.			



ประวัติผู้วิจัย .

นาย จักรพงศ์ กาญจนสมวงศ์ เกิดวันที่ 29 สิงหาคม พ.ศ. 2509 ที่อำเภอโนนไทย จังหวัด นครราชสีมา ได้รับการศึกษาในคณะวิทยาศาสตร์ มหาวิทยาลัย เกษตรศาสตร์ เมื่อปี พ.ศ. 2527 และ สำเร็จการศึกษา วิทยาศาสตร์บัณฑิต ในปี พ.ศ. 2531 .