

G.4 Simulation Model Outputs for MHC Alternatives

APPENDIX G

SIMAN V - License #8810427
Systems Modeling Corporation

Summary for Replication 1 of 1

Project: VERTICAL GENERIC ELECTRO Run execution date : 6/10/1997
Analyst: CHAD TONEY Model revision date: 7/10/1996

Replication ended at time : 163453.0

TALLY VARIABLES

Identifier	Average	Variation	Minimum	Maximum	Observations
TAKT TIME	45.201	.81575	34.000	306.00	3615
TIME IN SYSTEM	49.271	9.8667E-04	49.116	49.333	3616
TIME STOPPED	80.408	.69205	.00000	271.97	422

DISCRETE-CHANGE VARIABLES

Identifier	Average	Variation	Minimum	Maximum	Final Value
CARRIER Active	15.000	.00000	15.000	15.000	15.000
CARRIER Busy	.01106	9.4553	.00000	1.0000	.00000
# in ACCELERATOR_Q	.00148	26.015	.00000	1.0000	.00000
# in ACID DIP_Q	.00147	26.019	.00000	1.0000	.00000
# in CATALYST_Q	.00148	26.015	.00000	1.0000	.00000
# in CLEAN_Q	8.3941E-04	34.500	.00000	1.0000	.00000
# in ELECTROLESS_Q	.00192	22.819	.00000	1.0000	.00000
# in MICROETCH_Q	.00148	26.015	.00000	1.0000	.00000
# in PREDIP_Q	.00148	26.015	.00000	1.0000	.00000
# in RINSE1_Q	.00148	26.015	.00000	1.0000	.00000
# in RINSE2_Q	.00148	26.015	.00000	1.0000	.00000
# in RINSE3_Q	.00148	26.015	.00000	1.0000	.00000
# in RINSE4_Q	.00148	25.999	.00000	1.0000	.00000
# in RINSE5_Q	.00147	26.019	.00000	1.0000	.00000
# in RINSE6_Q	.00147	26.019	.00000	1.0000	.00000
# in RINSE7_Q	.00147	26.019	.00000	1.0000	.00000
# in STARTING_Q	.00000	--	.00000	.00000	.00000
# in TARNISH_Q	.00147	26.019	.00000	1.0000	.00000
# in CLEAN1_Q	.00000	--	.00000	.00000	.00000
# in MICROETCH1_Q	.00000	--	.00000	.00000	.00000
# in PREDIP1_Q	.00000	--	.00000	.00000	.00000
# in CATALYST1_Q	.00000	--	.00000	.00000	.00000
# in ACCELERATOR1_Q	.00000	--	.00000	.00000	.00000
# in ELECTROLESS1_Q	.00000	--	.00000	.00000	.00000
# in ACID DIP1_Q	.00000	--	.00000	.00000	.00000
# in TARNISH1_Q	.00000	--	.00000	.00000	.00000

COUNTERS

Identifier	Count	Limit
PARTS DONE	3616	Infinite

FREQUENCIES

Identifier	Category	--Occurrences--		Standard Percent	Restricted Percent
		Number	AvgTime		
STATE (CLEAN1_R)	CLEAN BATH	9	138.22	0.76	0.76
	BUSY	400	92.965	22.75	22.75
	IDLE	403	310.23	76.49	76.49
STATE (MICROETCH1_R)	MICRO BATH	18	145.66	1.60	1.60
	BUSY	400	94.395	23.10	23.10
	IDLE	405	303.88	75.30	75.30
STATE (PREDIP1_R)	PREDIP BATH	8	124.50	0.61	0.61
	BUSY	400	95.790	23.44	23.44
	IDLE	402	308.80	75.95	75.95
STATE (CATALYST1_R)	CATAL BATH	1	230.00	0.14	0.14
	BUSY	400	95.485	23.37	23.37
	IDLE	401	311.79	76.49	76.49
STATE (ACCELERATOR1_R)	ACCEL BATH	16	129.75	1.27	1.27
	BUSY	400	97.560	23.87	23.87
	IDLE	405	302.10	74.86	74.86
STATE (ELECTROLESS1_R)	ELECT BATH	10	113.60	0.70	0.70
	BUSY	400	98.875	24.20	24.20
	IDLE	401	306.15	75.11	75.11
STATE (ACID DIP1_R)	ACID BATH	6	146.00	0.54	0.54
	BUSY	400	99.445	24.34	24.34
	IDLE	401	306.23	75.13	75.13
STATE (TARNISH1_R)	TARN BATH	13	119.53	0.95	0.95
	BUSY	400	101.42	24.82	24.82
	IDLE	404	300.31	74.23	74.23

Execution time: 75.62 minutes.
Simulation run complete.

APPENDIX G

SIMAN V - License #8810427
Systems Modeling Corporation

Summary for Replication 1 of 1

Project: TYPICAL CARBON CONVEYORIZED
Analyst: CHAD TONEY

Run execution date : 10/ 4/1996
Model revision date: 7/11/1996

Replication ended at time 50808.6

TALLY VARIABLES

Identifier	Average	Variation	Minimum	Maximum	Observations
TAKT TIME	.81854	6.7748	.60608	195.00	62056
TIME IN SYSTEM	47.610	1.0902	12.996	257.69	62057
TIME STOPPED	74.507	1.0634	14.000	208.92	158

DISCRETE-CHANGE VARIABLES

Identifier	Average	Variation	Minimum	Maximum	Final Value
# in TO_CLEANER_Q	.00145	26.200	.00000	1.0000	.00000

COUNTERS

Identifier	Count	Limit
parts done	62057	Infinite

FREQUENCIES

Identifier	Category	--Occurrences-- Number	AvgTime	Standard Percent	Restricted Percent
STATE(CLEAN_R)	CLEAN BATH	26	147.01	7.52	7.52
	BUSY	124	12.460	3.04	3.04
	IDLE	136	334.12	89.44	89.44
STATE(MICROETCH_R)	MICRO BATH	21	160.66	6.64	6.64
	BUSY	124	24.645	6.01	6.01
	IDLE	138	321.58	87.34	87.34
STATE(CARBON_R)	BUSY	124	12.460	3.04	3.04
	IDLE	125	394.10	96.96	96.96
STATE(CONDITIONER_R)	CONDI BATH	20	142.03	5.59	5.59
	BUSY	124	19.674	4.80	4.80
	IDLE	134	339.76	89.61	89.61
STATE(CARBON2_R)	BUSY	124	19.674	4.80	4.80
	IDLE	125	386.95	95.20	95.20

Execution time: 32.93 minutes.

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Summary for Replication 1 of 1

Project: CONVEYORIZED TYPICAL CON Run execution date : 6/11/1997
Analyst: CHAD TONEY Model revision date: 7/10/1996

Replication ended at time : 29091.1

TALLY VARIABLES

Identifier	Average	Variation	Minimum	Maximum	Observations
TAKT TIME	.46866	9.1628	.35294	190.00	62056
TIME IN SYSTEM	38.993	1.2748	8.0000	216.01	62057
TIME STOPPED	77.321	.99426	.00000	192.20	92

DISCRETE-CHANGE VARIABLES

Identifier	Average	Variation	Minimum	Maximum	Final Value
# in TO_MICROETCHER_Q	.36856	1.3089	.00000	1.0000	1.0000

COUNTERS

Identifier	Count	Limit
PARTS DONE	62057	Infinite

FREQUENCIES

Identifier	Category	--Occurrences-- Number	AvgTime	Standard Percent	Restricted Percent
STATE(CLEAN_R)	CLEAN BATH	13	150.96	6.75	6.75
	BUSY	71	21.147	5.16	5.16
	IDLE	78	328.55	88.09	88.09
STATE(MICROETCH_R)	MICRO BATH	21	145.76	10.52	10.52
	BUSY	71	15.567	3.80	3.80
	IDLE	82	303.96	85.68	85.68
STATE(CATALYST_R)	BUSY	71	21.147	5.16	5.16
	IDLE	72	383.18	94.84	94.84
STATE(CONDUCT_R)	CONDUCT BATH	6	135.43	2.79	2.79
	BUSY	71	24.971	6.09	6.09
	IDLE	75	353.40	91.11	91.11
STATE(MICROETCH2_R)	MICRO2 BATH	21	145.76	10.52	10.52
	BUSY	71	24.971	6.09	6.09
	IDLE	82	295.81	83.38	83.38
STATE(CLEAN2_R)	CLEAN2 BATH	13	150.96	6.75	6.75
	BUSY	71	21.147	5.16	5.16
	IDLE	78	328.55	88.09	88.09

Execution time: 25.02 minutes.
Simulation run complete.

APPENDIX G

SIMAN V - License #8810427
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Summary for Replication 1 of 1

Project: CONVEYORIZED GENERIC ELE Run execution date : 6/10/1997
Analyst: CHAD TONEY Model revision date: 7/ 9/1996

Replication ended at time : 36063.0

TALLY VARIABLES

Identifier	Average	Variation	Minimum	Maximum	Observations
TAKT TIME	.58089	11.492	.31433	195.00	62056
TIME IN SYSTEM	52.938	1.1157	14.998	282.95	62057
TIME STOPPED	114.06	.69924	.00000	211.27	143

DISCRETE-CHANGE VARIABLES

Identifier	Average	Variation	Minimum	Maximum	Final Value
# in TO_CLEANER_Q	.00259	19.641	.00000	1.0000	.00000

COUNTERS

Identifier	Count	Limit
PARTS DONE	62057	Infinite

FREQUENCIES

Identifier	Category	--Occurrences-- Number	AvgTime	Standard Percent	Restricted Percent
STATE(ACCELERATOR_R)	ACCEL BATH	15	160.23	6.66	6.66
	BUSY	88	29.890	7.29	7.29
	IDLE	95	326.62	86.04	86.04
STATE(CLEAN_R)	CLEAN BATH	10	168.71	4.68	4.68
	BUSY	88	11.362	2.77	2.77
	IDLE	96	347.66	92.55	92.55
STATE(ELECTROLESS_R)	ELECT BATH	4	135.81	1.51	1.51
	BUSY	88	32.154	7.85	7.85
	IDLE	91	359.23	90.65	90.65
STATE(ACID DIP_R)	ACID BATH	6	174.40	2.90	2.90
	BUSY	88	33.135	8.09	8.09
	IDLE	91	352.75	89.01	89.01
STATE(MICROETCH_R)	MICRO BATH	21	165.74	9.65	9.65
	BUSY	88	16.644	4.06	4.06
	IDLE	102	305.07	86.29	86.29

STATE (CATALYST_R)	BUSY	88	25.024	6.11	6.11
	IDLE	89	380.45	93.89	93.89
STATE (PREDIP_R)	PREDIP BATH	13	126.76	4.57	4.57
	BUSY	88	25.024	6.11	6.11
	IDLE	93	346.37	89.32	89.32
STATE (TARNISH_R)	TARN BATH	28	146.91	11.41	11.41
	BUSY	88	45.458	11.09	11.09
	IDLE	100	279.48	77.50	77.50

Execution time: 35.08 minutes.
Simulation run complete.

APPENDIX G

SIMAN V - License #9999999
Systems Modeling Corporation

Summary for Replication 1 of 1

Project: GRAPHITE CONVEYORIZED Run execution date : 10/ 7/1996
Analyst: CHAD TONEY Model revision date: 7/11/1996

Replication ended at time : 33441.3

TALLY VARIABLES

Identifier	Average	Variation	Minimum	Maximum	Observations
TAKT TIME	.53876	8.2863	.43032	230.00	62056
TIME IN SYSTEM	50.811	1.3392	7.7983	262.99	62057
TIME STOPPED	66.957	1.3307	10.000	230.00	97

DISCRETE-CHANGE VARIABLES

Identifier	Average	Variation	Minimum	Maximum	Final Value
KNIFE_R Available	1.0000	.00000	1.0000	1.0000	1.0000
KNIFE_R Busy	.00000	--	.00000	1.0000	.00000
# in TO_CLEANER_Q	.05939	3.9795	.00000	1.0000	.00000

COUNTERS

Identifier	Count	Limit
PARTS DONE	62057	Infinite

FREQUENCIES

Identifier	Category	--Occurrences--		Standard Percent	Restricted Percent
		Number	AvgTime		
STATE(CLEAN_R)	CLEAN BATH	11	146.08	4.81	4.81
	BUSY	81	13.067	3.17	3.17
	IDLE	85	362.06	92.03	92.03
STATE(MICROETCH_R)	MICRO BATH	21	169.72	10.66	10.66
	BUSY	81	29.377	7.12	7.12
	IDLE	93	295.67	82.23	82.23
STATE(GRAPHITE_R)	GRAPH BATH	3	171.19	1.54	1.54
	BUSY	81	14.975	3.63	3.63
	IDLE	83	382.10	94.84	94.84

Execution time: 19.63 minutes.
Simulation run complete.

SIMAN V - License #8810427
Systems Modeling Corporation

Summary for Replication 1 of 1

Project: VERTICAL NONFORMALDEHYDE
Analyst: CHAD TONEY

Run execution date : 7/ 1/1997
Model revision date: 5/13/1996

Replication ended at time : 73313.7

TALLY VARIABLES

Identifier	Average	Variation	Minimum	Maximum	Observations
TAKT TIME	20.266	.81589	15.900	160.00	3615
TIME IN SYSTEM	49.864	.04022	49.600	66.400	3616
TIME STOPPED	62.084	.24716	.00000	127.82	243

DISCRETE-CHANGE VARIABLES

Identifier	Average	Variation	Minimum	Maximum	Final Value
ACCELERATOR_R Availabl	1.0000	.00000	1.0000	1.0000	1.0000
ACCELERATOR_R Busy	.12334	2.6660	.00000	1.0000	.00000
CLEAN_R Available	1.0000	.00000	1.0000	1.0000	1.0000
CLEAN_R Busy	.12340	2.6653	.00000	1.0000	1.0000
ACTIVATOR_R Available	1.0000	.00000	1.0000	1.0000	1.0000
ACTIVATOR_R Busy	.12337	2.6656	.00000	1.0000	.00000
ELECTROLESS_R Availabl	1.0000	.00000	1.0000	1.0000	1.0000
ELECTROLESS_R Busy	.77594	.53736	.00000	1.0000	1.0000
FLASH_R Available	1.0000	.00000	1.0000	1.0000	1.0000
FLASH_R Busy	.12331	2.6664	.00000	1.0000	.00000
MICROETCH_R Available	1.0000	.00000	1.0000	1.0000	1.0000
MICROETCH_R Busy	.12337	2.6656	.00000	1.0000	.00000
POSTDIP_R Available	1.0000	.00000	1.0000	1.0000	1.0000
POSTDIP_R Busy	.12337	2.6656	.00000	1.0000	1.0000
PREDIP_R Available	1.0000	.00000	1.0000	1.0000	1.0000
PREDIP_R Busy	.12337	2.6656	.00000	1.0000	.00000
RINSE1_R Available	1.0000	.00000	1.0000	1.0000	1.0000
RINSE1_R Busy	.12337	2.6656	.00000	1.0000	.00000
RINSE2_R Available	1.0000	.00000	1.0000	1.0000	1.0000
RINSE2_R Busy	.12337	2.6656	.00000	1.0000	.00000
RINSE3_R Available	1.0000	.00000	1.0000	1.0000	1.0000
RINSE3_R Busy	.12334	2.6660	.00000	1.0000	.00000
RINSE4_R Available	1.0000	.00000	1.0000	1.0000	1.0000
RINSE4_R Busy	.12334	2.6660	.00000	1.0000	.00000
TARNISH_R Available	1.0000	.00000	1.0000	1.0000	1.0000
TARNISH_R Busy	.12331	2.6664	.00000	1.0000	.00000
RINSE5_R Available	1.0000	.00000	1.0000	1.0000	1.0000
RINSE5_R Busy	.12331	2.6664	.00000	1.0000	.00000
CARRIER Active	15.000	.00000	15.000	15.000	15.000
CARRIER Busy	.02566	6.1618	.00000	1.0000	.00000
POSTDIP1_R Available	1.0000	.00000	1.0000	1.0000	1.0000
POSTDIP1_R Busy	.00000	--	.00000	1.0000	.00000

COUNTERS

APPENDIX G

Identifier	Count	Limit
PARTS DONE	3616	Infinite

FREQUENCIES

Identifier	Category	--Occurrences-- Number	AvgTime	Standard Percent	Restricted Percent
STATE (ACCELERATOR1_R)	ACCEL BATH	16	81.000	1.77	1.77
	BUSY	179	65.391	15.97	15.97
	IDLE	193	312.50	82.27	82.27
STATE (ACTIVATOR1_R)	BUSY	179	65.391	15.97	15.97
	IDLE	180	342.27	84.03	84.03
STATE (CLEAN1_R)	CLEAN BATH	9	66.314	0.81	0.81
	BUSY	179	65.100	15.89	15.89
	IDLE	186	328.30	83.29	83.29
STATE (ELECTROLESS1_R)	ELECT BATH	10	61.746	0.84	0.84
	BUSY	179	64.966	15.86	15.86
	IDLE	186	328.31	83.30	83.30
STATE (FLASH1_R)	FLASH BATH	6	81.000	0.66	0.66
	BUSY	179	65.491	15.99	15.99
	IDLE	184	332.09	83.35	83.35
STATE (MICROETCH1_R)	MICRO BATH	18	63.405	1.56	1.56
	BUSY	179	64.771	15.81	15.81
	IDLE	190	318.83	82.63	82.63
STATE (PREDIP1_R)	PREDIP BATH	8	64.491	0.70	0.70
	BUSY	179	65.391	15.97	15.97
	IDLE	186	328.45	83.33	83.33
STATE (TARNISH1_R)	TARN BATH	14	73.400	1.40	1.40
	BUSY	179	64.973	15.86	15.86
	IDLE	191	317.57	82.73	82.73

Execution time: 40.03 minutes.
Simulation run complete.

APPENDIX G

SIMAN V - License #9999999
Systems Modeling Corporation

Summary for Replication 1 of 1

Project: TYPICAL ORGANIC PALLADIUM VERTICAL Run execution date : 9/26/1996
Analyst: CHAD TONEY Model revision date: 7/11/1996

Replication ended at time : 31763.2

TALLY VARIABLES

Identifier	Average	Variation	Minimum	Maximum	Observations
TAKT TIME	8.7786	2.1895	2.0750	226.95	3615
TIME IN SYSTEM	33.349	.44838	27.575	137.57	3616
TIME STOPPED	77.536	.53042	.02500	187.45	139

DISCRETE-CHANGE VARIABLES

Identifier	Average	Variation	Minimum	Maximum	Final Value
CARRIER Active	13.000	.00000	13.000	13.000	13.000
CARRIER Busy	.12964	2.6342	.00000	2.0000	.00000

COUNTERS

Identifier	Count	Limit
PARTS DONE	3616	Infinite

FREQUENCIES

Identifier	Category	--Occurrences-- Number	AvgTime	Standard Percent	Restricted Percent
STATE(CLEAN1_R)	CLEAN BATH	23	91.783	6.65	6.65
	BUSY	77	40.221	9.75	9.75
	IDLE	94	282.50	83.60	83.60
STATE(CONDITIONER1_R)	CONDI BATH	18	89.387	5.07	5.07
	BUSY	77	41.871	10.15	10.15
	IDLE	90	299.22	84.78	84.78
STATE(PREDIP1_R)	PREDIP BATH	14	90.642	4.00	4.00
	BUSY	77	42.793	10.37	10.37
	IDLE	88	309.08	85.63	85.63
STATE(CONDUCTOR1_R)	CONDUCT BATH	2	65.158	0.41	0.41
	BUSY	77	44.891	10.88	10.88
	IDLE	79	356.66	88.71	88.71
STATE(POSTDIP1_R)	POSTDIP BATH	18	101.21	5.74	5.74
	BUSY	77	43.271	10.49	10.49
	IDLE	90	295.65	83.77	83.77
STATE(ACID DIP1_R)	ACID BATH	22	91.494	6.34	6.34
	BUSY	77	46.718	11.33	11.33
	IDLE	95	275.29	82.34	82.34
STATE(MICROETCH1_R)	MICRO BATH	18	91.800	5.20	5.20
	BUSY	77	40.355	9.78	9.78
	IDLE	91	296.74	85.01	85.01

Execution time: 26.28 minutes.
Simulation run complete.

SIMAN V - License #8810427
Systems Modeling Corporation

Summary for Replication 1 of 1

Project: CONVEYORIZED GENERIC TIN Run execution date : 6/10/1997
Analyst: CHAD TONEY Model revision date: 7/11/1996

Replication ended at time : 26082.6

TALLY VARIABLES

Identifier	Average	Variation	Minimum	Maximum	Observations
TAKT TIME	.42017	11.661	.27134	190.00	62056
TIME IN SYSTEM	64.169	1.1194	8.6078	433.99	62057
TIME STOPPED	93.815	.90075	10.000	241.52	96

DISCRETE-CHANGE VARIABLES

Identifier	Average	Variation	Minimum	Maximum	Final Value
# in TO_CLEANER_Q	.03874	4.9813	.00000	1.0000	.00000

COUNTERS

Identifier	Count	Limit
PARTS DONE	62057	Infinite

FREQUENCIES

Identifier	Category	--Occurrences-- Number	AvgTime	Standard Percent	Restricted Percent
STATE(CLEAN_R)	CLEAN BATH	9	181.61	6.27	6.27
	BUSY	63	4.9883	1.20	1.20
	IDLE	71	339.91	92.53	92.53
STATE(MICROETCH_R)	MICRO BATH	21	129.85	10.45	10.45
	BUSY	63	23.525	5.68	5.68
	IDLE	76	287.81	83.86	83.86
STATE(PREDIP_R)	PREDIP BATH	15	149.46	8.60	8.60
	BUSY	63	32.337	7.81	7.81
	IDLE	72	302.82	83.59	83.59
STATE(ACID DIP_R)	ACID BATH	7	122.88	3.30	3.30
	BUSY	63	42.546	10.28	10.28
	IDLE	64	352.21	86.43	86.43
STATE(CATALYST_R)	BUSY	63	32.337	7.81	7.81
	IDLE	64	375.70	92.19	92.19
STATE(ACCELERATOR_R)	ACCEL BATH	7	153.10	4.11	4.11
	BUSY	63	35.931	8.68	8.68
	IDLE	68	334.51	87.21	87.21

Execution time: 23.80 minutes.
Simulation run complete.

APPENDIX G

SIMAN V - License #8810427
Systems Modeling Corporation

Summary for Replication 1 of 1

Project: VERTICAL GENERIC TIN STA Run execution date : 6/10/1997
Analyst: CHAD TONEY Model revision date: 7/11/1996

Replication ended at time : 48525.4

TALLY VARIABLES

Identifier	Average	Variation	Minimum	Maximum	Observations
TAKT TIME	13.409	1.9911	9.2750	294.97	3615
TIME IN SYSTEM	52.839	.08080	50.000	65.625	3616
TIME STOPPED	102.49	.73478	.00000	286.32	133

DISCRETE-CHANGE VARIABLES

Identifier	Average	Variation	Minimum	Maximum	Final Value
CARRIER Active	11.000	.00000	11.000	11.000	11.000
CARRIER Busy	.06573	3.8295	.00000	2.0000	.00000

COUNTERS

Identifier	Count	Limit
PARTS DONE	3616	Infinite

FREQUENCIES

Identifier	Category	--Occurrences-- Number	AvgTime	Standard Percent	Restricted Percent
STATE(CLEAN1_R)	CLEAN BATH	7	170.93	2.47	2.47
	BUSY	119	63.565	15.59	15.59
	IDLE	121	328.63	81.95	81.95
STATE(MICROETCH1_R)	MICRO BATH	18	202.66	7.52	7.52
	BUSY	119	63.707	15.62	15.62
	IDLE	127	293.67	76.86	76.86
STATE(PREDIP1_R)	PREDIP BATH	10	67.055	1.38	1.38
	BUSY	119	75.149	18.43	18.43
	IDLE	120	324.26	80.19	80.19
STATE(CATALYST1_R)	BUSY	119	75.149	18.43	18.43
	IDLE	119	332.62	81.57	81.57
STATE(ACCELERATOR1_R)	ACCEL BATH	7	107.83	1.56	1.56
	BUSY	119	74.082	18.17	18.17
	IDLE	125	311.63	80.28	80.28
STATE(ACID DIP1_R)	ACID BATH	8	159.12	2.62	2.62
	BUSY	119	77.569	19.02	19.02
	IDLE	121	314.22	78.35	78.35

Execution time: 36.25 minutes.
Simulation run complete.