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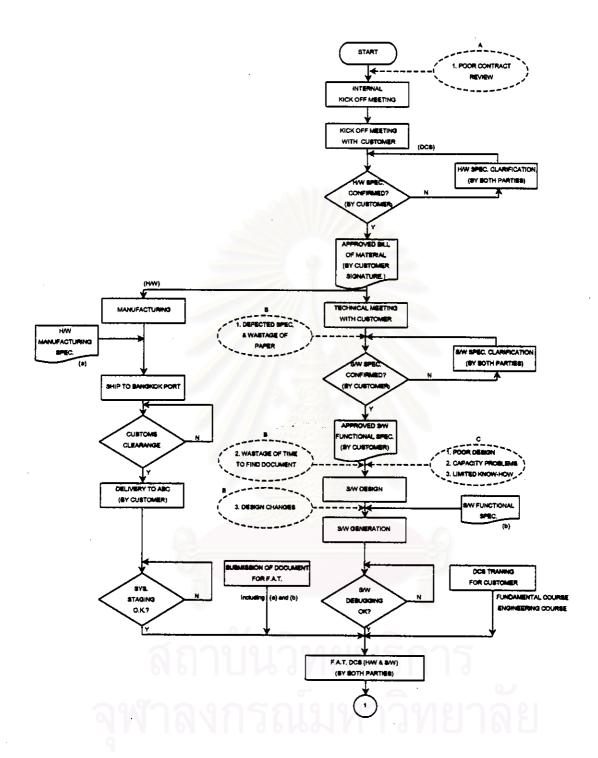
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APPENDIX I DCS PROJECT EXECUTION AND STATED PROBLEMS

พาลงกรณ์มหาวิทยาลัย

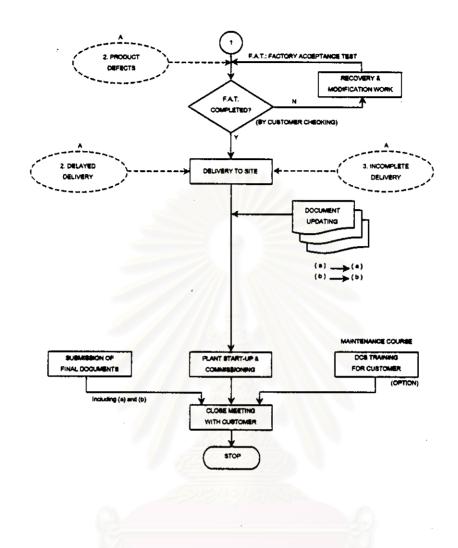


NOTE:

S/W : DCS SOFTWARE H/W : DCS HARDWARE

A : LACK OF PROCEDURES TO CONTROL THE PROJECT EXECUTION

B : LACK OF THE DOCUMENT AND DATA CONTROL C : TECHNICAL PROBLEMS



NOTE: S/W : DCS SOFTWARE H/W : DCS HARDWARE

A : LACK OF PROCEDURES TO CONTROL THE PROJECT EXECUTION B : LACK OF THE DOCUMENT AND DATA CONTROL

C : TECHNICAL PROBLEMS

APPENDIX II FAILURE MODE AND EFFECT ANALYSIS (FMEA) AND FAULT TREE ANALYSIS (FTA) FOR DISTRIBUTED CONTROL SYSTEM PROJECT

TOTEMBE	LMEV DOC MINDER	FMEA-PC-001		
FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA)	Page	1	of 16	
Item DCS Project Process Responsibility DCS Project Process	Prepared By	Sayom Surijamongko	y .	
DCS System Centum-XL Key Date 1 July 1998	FMEA Date (Orig.)	10 June 1998		
Core Team 1. Sakchai 2. Pongsak 3. Sayom 4. Suniboon 5. Sayamol	FMEA Date (Rev.)	20 December 1998	1	

Process	Potential	Potential	П	Potential	0		D			Responsibility	Actio	n Re	sults		
Function	Faiture	Effect(s)	s	cause(s) /	С	Current	е	R.	Recommended	&		s	0	D	R.
and	Mode	of	е	Mechanism(s)	C	Process	t	P.	Action(s)	Target	Actions	е	С	е	Ρ.
Requirements	·	Faiture	١v	of Failure	u	Controls	е	N.		Completion	Taken	v	c	t	N.
		<u> </u>			r		С			Date		l			
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sales	receiving	form the	<u></u>	customer							***************************************	T			
	from sales	project team		(Technical								1			**********
******************		in EGD	1	specification)							***************************************	1			
***********			<u> </u>	Sales staff	7	None	10	140	Establish	Sayom	Control Doc.	2	7	5	70
***************************************			<u></u>	prepares to					the formal	15 Dec 98	D1 was	Ī			**********
***************************************			<u> </u>	submit in the					procedure		implemented in				***********
****************************			<u> </u>	internal K.O.M.					- Form		RCA2 project	T			***********
			<u> </u>						- Document		***************************************	1	ļ		**********
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			 	*************************************	L	****			4		41.000000000000000000000000000000000000				
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	information	the project	<u> </u>	information from	<u> </u>		1			***********					
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		effectively	<u> </u>	- Do not know the	ļ							<u></u>		L	
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	suitable for	customer		the selection						***************************************		T			
	the project	specification			[T		***************************************	T	**********		**********
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FAILURE MODE AND	EFFECTS ANALYSIS (PROCESS FI	MEA!

FAILURE MO	DDE AND EFFECTS ANALYSIS (PROCESS FMEA)	Page	2 of	16
Item DCS Project	Process Responsibility DCS Project Process	Prepared By	Sayom Surijamongkol	
DCS System Centum-XL	Key Date 1 July 1998	FMEA Date (Orig.)	10 June 1998	
Core Team 1. Sakchai 2	Pongsak 3. Sayom 4. Suniboon 5. Sayamol	FMEA Date (Rev.)	20 December 1998	

FMEA Doc Number

FMEA-PC-001

Process	Potential	Potential		Potential	0		D		T ·	Responsibility	Action	ı Re:	sults		
Function	Failure	Effect(s)	s	cause(s)/	С	Current	е	R.	Recommended			s	0	D	R.
and	Mode	or	l e	Mechanism(s)	С	Process	t	Р.	Action(s)	Target	Actions	e	c	e	Р.
Requirements		Failure	v	of Failure	u	Controls	e	N.		Completion	Taken	V		i	N.
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	between the	customer	1	and engineers do	1				lim. Study of	Sayom	D2 was	<u> </u>			
	Invitation to	dissatisfaction	†	not study the		***************************************			Internal K.O.M.		implemented in			******	
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	contract is			attend the meeting	†	***************************************	******	rtv:*******	work process	******************************					
	not discussed					<u> </u>				·····		* *****			************
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	Verbal com-	Lead to the	5	Sales staff forgets	6	Internal K.O.M.	5	150	Put examples	Sayamol and	Control Doc.	5	6	3	90
	mitments are	customer	<u> </u>	the commitment	<u>L</u>	Review Check-			to the item	Sayom	D2 was				
************	not fully	dissatisfaction	<u> </u>			list			'Commitment'	15 Dec 98	implemented in				
	discussed		<u> </u>						in the Internal		RCA2 project	T	[
		<u></u>	<u> </u>						K.O.M. Review						
									Checklist		#*************************************			•••••	***************************************
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1.1	<u> </u>				<u> </u>					····		ļ			•••••••
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	the internal			K.O.M. Review	ļ						***************************************		·······		
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Key Date

DCS System

Core Team

Centum-XL

FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA) Item DCS Project Process Responsibility

1 July 1998

Page DCS Project Process Prepared By FMEA Date (Orig.)
FMEA Date (Rev.) 1. Sakchai 2. Pongsak 3. Sayom 4. Suniboon 5. Sayamol

FMEA Doc Number

FMEA-PC-001

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Sayom Surijamongkol

20 December 1998

10 June 1998

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16

Process	Potential	Potential		Potential	0		D			Responsibility	Actio	on Re	suits		
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	<u> </u>				ſ		С			Date					
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	checklist		 		-	***************************************		***********							
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	Do not pro-	Missing	2	Do not think that	4	None	10	80	_		No action		<u> </u>	-	
	ceed the	some		the internal K.O.M.						***************************************		1			
	follow-up	information	<u></u>	is important						***************************************	! !	*************		[
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Item	DCS Project	Process Responsibility	DCS Project Process

1. Sakchai 2. Ponosak 3. Sayom 4. Suniboon 5. Sayamol

1 July 1998

Key Date

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Prepared By Sayon; Surijamongkol
FMEA Date (Orig.) 10 June 1998
FMEA Date (Rev.) 20 December 1998

Process	Potential	Potential		Potential	0		D			Responsibility	Actio	n Re	sults		
Function	Failure	Effect(s)	S	cause(s) /	C	Current	е	R.	Recommended	&		s	0	D	R.
and	Mode	of	е	Mechanism(s)	C	Process	t	P.	Action(s)	Target	Actions	e	c	е	P.
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	cution plan	control the	ļ	as a serious	.ļ			******************	cution plan	15 Dec 98	implemented in				
		project		matter	.}				checking in	***************************************	RCA2 project	· }	}		
		effectively	ļ	initial project					the work pro-			. 	 		ļ
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FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA)	Page 5 of 16	
tem DCS Project Process Responsibility DCS Project Process	Prepared By Sayom Surijamongkol	•
DCS System Centum-XL Key Date 1 July 1998	FMEA Date (Orig.) 10 June 1998	
Core Team1. Sakchai 2. Pongsak 3. Sayom 4. Suniboon 5. Sayamol	FMEA Date (Rev.) 20 December 1998	

Process	Potential	Potential		Potential	0		D			Responsibility	Actio	n Re	sults		
Function	Faiture	Effect(s)	s	cause(s) /	C	Current	е	R.	Recommended	&		s	0	D	R.
and	Mode	of	e	Mechanism(s)	C	Process	t	P.	Action(s)	Target	Actions	е	С	e	Ρ.
Requirements		Failure	١v	of Faiture	u	Controls	е	N.		Completion	Taken	V	c	t	N.
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	design at a	for approval							design review		implemented in	I			
	specified								checklist, and		RCA2 project	<u> </u>			
	period				1	***************************************			walkthrough				<u> </u>		
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Item	DCS Project	Process Responsibility	DCS Project Process	Prepared By	Sayom Surijamong	col		
DCS S	ystem Centum-XL	Key Date 1 July 1998		FMEA Date (Orig.)	10 June 1998			
Core T	eam 1 Sakchai 2	Ponosak 3 Savom 4 Suniboo	n 5. Savamol	FMEA Date (Rev.)	20 December 199	98		

Process	Potential	Potential	Г	Potential	То		D			Responsibility	Action	Res	ults		
Function	Failure	Effect(s)	s	cause(s) /	C	Current	е	R.	Recommended			s	0	ρĺ	R.
and	Mode	of	e	Mechanism(s)	c	Process	t	P.	Action(s)	Target	Actions	e	Ç	e	Р.
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1. Sakchai 2. Pongsak 3. Sayom 4. Suniboon 5. Sayamol

Process Responsibility

Key Date

Item DCS Project

Centum-XL

DCS System

Core Team

FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA)

1 July 1998

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 Sayom Surijamongkol

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 10 June 1998

 FMEA Date (Rev.)
 20 December 1998

Process Potential Potential **Potential** D Responsibility 0 **Action Results** Function Failure Effect(s) S cause(s) / SOD C Current e R. Recommended 8 R. and Mode of Mechanism(s) P. Action(s) Target Actions е C **Process** e C e P. Requirements Faiture of Failure Controis u e N. Completion Taken N. C Date C Validation of None the approved hardware spec Prepare Fill in the Misunderstanding 5 Visual check Rework 3 15 No action document for purchase DCS hardware requisition ordering form incorrectiv Send the Rework 3 No formal 8 Visual check 5 120 Ordering Control Doc. 3 3 Savamol and 3 27 document to repeatedly. procedure procedure and Sayom D8 was Order Handtake long time list of required 15 Dec 98 implemented in ling in wrong to finish order RCA2 project document are requisition format required processing Purchase order Out of scope to Singapore DCS hardware Out of scope manufacturing Out of scope DCS hardware delivered from Singapore to the company

DCS Project Process

	•	POTENTIAL		FMEA Doc Number	FMEA-PC-001		
	FAILURE MO	DE AND EFFECTS ANALYSIS	(PROCESS FMEA)	Page	8	of	16
Item_	DCS Project	Process Responsibility	DCS Project Process	Prepared By	Sayom Surijamongko	, —	
DCS :	System Centum-XL	Key Date 1 July 1998		FMEA Date (Orig.)	10 June 1998		
Core :	Team 1. Sakchai 2.	Ponosak 3 Savom 4 Sunibo	on 5 Savarnol	FMFA Date (Rev.)	20 December 1998	i	

Process	Potential	Potential	Π	Potential	0		D			Responsibility	Action	ı Re	sults		
Function	Faiture	Effect(s)	s	cause(s) /	С	Current	e	R.	Recommended	8.		s	0	D	R.
and	Mode	of	е	Mechanism(s)	С	Process	t	P.	Action(s)	Target	Actions	e	С	е	P.
Requirements		Failure	l۷	of Faiture	u	Controls	е	N.		Completion	Taken	l۷	c	t	N.
·					г		С			Date					
Technical	Misunder-	Design	8	Do not study the	5	None	10	400		Sayamol and	implemented in	8	4	3	96
meeting (control	standing the	mistake		requirement			<u> </u>		the data by	Sayom	RCA2 project	1	<u> </u>		
function	customer's		<u> </u>	seriously and a lot			<u> </u>		senior	15 Dec 98					
requirement)	control			of control detail is					engineer			T	Ī		
	concept			discussed in a short					or project			1			
	requirement			period					engineer is			Ī			
			<u> </u>						required	<u> </u>		Ī			************
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Software spec	(see Design	-	-	-	-	-	-	-	-	-	-	T -	-	-	-
design	FMEA)]			
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									***************************************		***************************************	1	ļ		***************************************
Submission of	Number of	Resend,	3	Do not check with	3	Check with the	2	18	-	-	No action	-	-	-	-
software spec	document	May lead to		the contract		contract									
for approval	submitted for	the customer	[T			
	approval is not	dissatisfaction							*****************************	<u> </u>	***************************************	1			
	equal to the					[***************************************	Ť	Ī	*****	
	agreed					Ī	Ī	************************		<u> </u>	***************************************	1			~
	number						<u> </u>		1			<u> </u>	<u> </u>		
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Approval of the	None	-	-	-	-	I-	-	-	-	<u>-</u>	-	T	<u> </u>	-	-
software spec	<u> </u>		····		*****			*************				T:::::			***************************************
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		POTENTIAL		FMEA Doc Number	FMEA-PC-001
		DE AND EFFECTS ANALYSIS	(PROCESS FMEA)	Page	9 of
Item_	DCS Project	_ Process Responsibility	DCS Project Process	Prepared By	Sayom Surijamongkol
	ystem Centum-XL	Key Date1 July 1998		FMEA Date (Orig.)	10 June 1998
Core 1	eam1. Sakchai 2.	Pongsak 3. Sayom 4. Suniboo	n 5. Sayamoi	FMEA Date (Rev.)	20 December 1998

Process	Potential	Potential		Potential	0		D			Responsibility	Actio	n Re	sults		
Function	Faiture	Effect(s)	S	cause(s) /	С	Current	е	R.	Recommended	&		s	0	D	R.
and	Mode	of	е	Mechanism(s)	С	Process	t	Ρ.	Action(s)	Target	Actions	l e	l c	e	P.
Requirements		Faiture	V	of Failure	u	Controls	е	N.		Completion	Taken	١v	c	ŧ	N.
	<u> </u>				Г		С			Date			_		'
Validation of	None	<u> </u> -		-	-	- /	-	•	-	-	-	1-	-	-	
the approved										***************************************	***************************************	†			
software spec	***************************************	***************************************	ļ			******************************			********************	**************************	***************************************				
DCS software	(See Design	***************************************	ļ	**************************************		***************************************			***************************************			<u>† </u>		*******	
design	FMEA)	-	<u> </u>						-	-	-	<u> </u>		-	
uesign	FMEA)									.		 -			
Monitoring	Poor	Project delay	7	Lack of the process	8	To ask the	8	448	Walkthrough	Sayamol and	Control Doc.	7	4	3	84
of the project	monitoring	and poor		to control project		project		************		Sayom	D4,D26,D27	+	<u>-</u>		
		software	ļ	in detail		members			to use together		were	†			L
		design (it is		***************************************		about project			with the detail		implemented in	†			
		designed in			******	progress and			project		RCA2 project	 		*********	···
]	hurry manner)				do the monthly			schedule	******	7.07 E p. 51000	†		*******	
				***************************************		progress report					******************************	†			
			******		*****				project		·······	†		*****	
			*******	Do not use and	8	-			progress		***************************************	†******			
				follow the project				h	monthly report		***************************************	†			
				schedule seriously		***************************************			is required	**********	***************************************	!			
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************************				is planned too							***************************************				
******				general and in											
*********************				monthly (lack				************							
***********************				of tool to control it	.,							T''''	1		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
		9 [weekly)			I				****************	T'''''			

FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA)

Item DCS Project Process Responsibility DCS Project Process

DCS System Centum-XL Key Date 1 July 1998

Core Team 1. Sakchai 2. Pongsak 3. Sayom 4. Suniboon 5. Sayamol

FMEA Doc Number FMEA-PC-001
Page 10 of 16
Prepared By Sayom Surijamongkol
FMEA Date (Orig.) 10 June 1998
FMEA Date (Rev.) 20 December 1998

Process	Potential	Potential		Potential	0	2, 	D			Responsibility	Actio	n Re	sults		
Function	Failure	Effect(s)	s	cause(s)/	C	Current	е	R.	Recommended			s	0	D	R.
and	Mode	of	e	Mechanism(s)	С	Process	t	P.	Action(s)	Target	Actions	l e	c	е	P.
Requirements		Failure	١v	of Failure	u	Controls	e	N.		Completion	Taken	l۷	c	l t	N.
•		J			ε		С			Date		`	ľ		
Monitoring	Poor	Project delay	7	Monthly progress	8	To ask the	8	448	see page	Sayamol and	Control Doc.	7	4	3	84
of the project	monitoring	and poor	<u> </u>	report is varied from		project			9 of 16	Sayom	D4,D26,D27				
		software		project to project		members				15 Dec 98	were	T	I		
		design (it is		and it is not specific		about project					implemented in	T	I		
		designed in				progress and					RCA2 project	T			
		hurry manner)				do the monthly						T	Ī		
						progress report				[T	I		
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Application of	None	-	-	-	-	<u>-</u>	-	-	_	_	_	†	-	-	_
the staging area			†			<u> </u>	*******	**********			***************************************	†	1	*******	
			!	D	******	İ	********	**********				†	•		,
								************				******			
Software	Typing errors	Rework	3	Human error, the	6	Visual check	3	54	-	_	No action	<u> </u>	-	-	-
generation		-		document for		(screen or						I			
(Graphic)			I	generation is not		printing paper)						T	Ĭ		
			Γ	clear, and								T	<u> </u>		***********
				misunderstanding								Ī	Ī		***********
	Ī		<u> </u>									T	Ī	*****	
	Missing items	Rework	3								***************************************	<u> </u>	<u> </u>		
***************************************	 	Rework		101 411								ļ	 		
		Rework	3					**********			***************************************	+			
	of items		l	Į		1)		i	I		1	I		l

POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA)

1 July 1998

Process Responsibility

Key Date

Item DCS Project

Centum-XL

DCS System

Core Team

FMEA Doc Number FMEA-PC-001 11 Page of 16 DCS Project Process Prepared By Sayom Surijamongkol FMEA Date (Orig.) 10 June 1998 1. Sakchai 2. Pongsak 3. Sayom 4. Suniboon 5. Sayamol FMEA Date (Rev.) 20 December 1998

Process	Potential	Potential		Potential	ि		D			Responsibility	Actio	n Re	sults		
Function	Faiture	Effect(s)	s	cause(s) /	C	Current	е	R.	Recommended	8.		s	О	Б	R.
and	Mode	of	e	Mechanism(s)	C	Process	t	P.	Action(s)	Target	Actions	l e	c	e	Р.
Requirements		Failure	V	of Failure	u	Controls	е	N.		Completion	Taken	l v	c	l i	N.
•					r		c			Date					
Software	No	Rework	3	Human error, the	6	Visual check	3	54	1-	-	No action	1 -	-	-	-
generation	consistency			document for		(screen or						1			***************************************
(Graphic)	on the same		T	generation is not		printing paper)						T	ļ	*******	
	items of		T	clear, and	T					***************************************	***************************************	1			ĺ
	different pages		Ţ	misunderstanding						Brrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr	*****************************	<u> </u>			
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	ment of line,		T								***************************************	†			***************************************
	and arrows		1	•							***************************************	1			
	Resolution	Rework	3	······································	 				_	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	No action	 			-
	effects		_									!			
	Wrong priority	Rework	3		-			**********	-		No action	 -			
	setting		<u> </u>	***************************************		**************************************			d	***************************************					
	item overlap	Rework	3						***************************************	-	No action	<u> - </u>	-	_	•
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	instrument		1		T	***************************************			***************************************		***************************************	†			************
	ranges		1_		<u> </u>					**************************************	******************************	!			
(Sequence)	Typing errors	Rework	4	Human error,	6	Visual check	3	72	-	_	No action	-	·		
			Ī	unclear document	T	(screen or					***************************************	T			******
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FAILURE	MODE AND EFFECTS ANALYSIS	(PROCESS FMEA)
S Project	Process Responsibility	DCS Project Proces

 Item
 DCS Project
 Process Responsibility
 DCS Project Process

 DCS System
 Centum-XL
 Key Date
 1 July 1998

 Core Team
 1. Sakchai
 2. Pongsak
 3. Sayom
 4. Suniboon
 5. Sayamol

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Page 12 of 16
Prepared By Sayom Surijamongkol
FMEA Date (Orig.) 10 June 1998
FMEA Date (Rev.) 20 December 1998

Process	Potential	Potential		Potential	0		D			Responsibility	Action	n Re	sults		
Function	Failure	Effect(s)	s	cause(s) /	С	Current	е	R.	Recommended	&	T	S	0	D	R.
and	Mode	of	e	Mechanism(s)	С	Process	t	P.	Action(s)	Target	Actions	е	c	е	P.
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Check the	Errors exist	Errors in	3	Human errors	4	None	3	36	-	-	No action	-	-	-	-
generated	but they	debugging				(errors are						Ī			
software	cannot be	stage				found in						T	Ī		[
	found		Ī			debugging					***************************************	T	Ī		[
						stage)		· · · · · · · · · · · · · · · · · · ·		***************************************	• • • • • • • • • • • • • • • • • • •		ļ		

DCS software	Not enough	Uncompleted	7	Poor monitoring and	7	Senior	8	392		Sayamol and	Control Doc.	7	3	3	63
debugging	time to debug	software and		control the project		engineer				Sayom	D4,D17,D18	.	ļ		
	all software	customer		leads to short time		to help system			list or punch	15 Dec 98	D19 were	<u> </u>	.		
*		dissatisfaction	<u> </u>	in debugging stage		engineer			list, debugging		implemented in	<u> </u>	ļ		
						debugging			review check-	**************************************	RCA2 project	1	<u></u>		
	Don't perform		<u> </u>	No suitable form to		software			tist, and	***************************************			<u>[</u>		
	the integrated		<u> </u>	list all errors and					software media			<u> </u>	<u> </u>		
	function test		<u> </u>	remind to correct					handling			1	[Ĺ
			<u> </u>	them					procedure are			<u> </u>			
	Do not check								required			I			
	the DCS			No formal											
	hardware			procedure								I			
	according to			for all projects								<u> </u>			
	the F.A.T.														Ī
*******************************	procedure										4		ļ		
	Do not test					*******************************				***************************************		<u> </u>			
	all possible												<u> </u>		L
	conditions in														
	software	N. I													
	functional					T	[T	***************************************		1			
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FMEA Doc Number FMEA-PC-001 FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA) Page_ 13 of 16 Process Responsibility
Key Date 1 July 1998 Item DCS Project DCS Project Process Prepared By Sayom Surijamongkol DCS System Centum-XL FMEA Date (Orig.) 10 June 1998 1. Sakchai 2. Pongsak 3. Sayom 4. Suniboon 5. Sayamol Core Team FMEA Date (Rev.) 20 December 1998

Process	Potential	Potential	Ì	Potential	0		D			Responsibility	Actio	n Re	sults		
Function	Faiture	Effect(s)	s	cause(s) /	С	Current	е	R.	Recommended	8	-	s	o	D	R.
and	Mode	· of	е	Mechanism(s)	C	Process	t	P.	Action(s)	Target	Actions	e	c	e	P.
Requirements		Failure	١v	of Faiture	u	Controls	е	N.		Completion	Taken	l۷	c	l t	N.
	j				r		С			Date					
DCS software	Errors found	see previous										1			
debugging	are forgotten	page	<u> </u>					********		·	***************************************	1		•	
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Preparation of	Typing errors	Rework	3	Human errors	3	Visual check	2	18	_	_	No action	Ι-	<u> </u>	_	_
the F.A.T.												L			
procedure												I			
												Ī			
Submission of	Late to submit	Customer to	2	No planning	4	None	10	80	_	-	No action	Ι-	_	-	_
the F.A.T.	the document	study the										I			
procedure	to the	document at	<u> </u>		<u>.L</u>							I			
document	customer for	the F.A.T.													
	their study and	period			Ι										
***	approvai	(waste time)	<u> </u>												
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Factory	Fail to conduct	Customer is	6	F.A.T. period is	6	Follow the	3	108	Follow the	Sayamol and	implemented in	6	4	3	72
Acceptance	the customer	compelled		too short		F.A.T.			F.A.T.	Sayom	RCA2 project				
Гest (F.A.T.)	to test and	to accept the		Poor control		procedure			procedure with	15 Dec 98					
and recovery	finish at the	hardware and							the F.A.T.						
work	specified time	software test							schedule						
					T		1	~	carefully		Ī	Ī			*************

1. Sakchai 2. Pongsak 3. Sayom 4. Suniboon 5. Sayamol

DCS System

Core Team

Centum-XL

FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA) Process Responsibility Key Date 1 July 1998 Item DCS Project DCS Project Process

FMEA Doc Number FMEA-PC-001 Page_ 14 of 16 Prepared By Sayom Surijamongkol FMEA Date (Orig.)
FMEA Date (Rev.) 10 June 1998 20 December 1998

Process	Potential	Potential		Potential	0		D			Responsibility	Actio	n Re:	suits		
Function	Failure	Effect(s)	s	cause(s) /	С	Current	е	R.	Recommended	8		s	О	D	R.
and	Mode	· of	e	Mechanism(s)	С	Process	t	P.	Action(s)	Target	Actions	l e	c	е	P.
Requirements	ļ	Faiture	١v	of Failure	u	Controls	е	N.		Completion	Taken] _v	l c	t	N.
			<u>l</u>		ř		c			Date		1			
	Uncompleted	Customer	8	Software is not	7	Senior	6	336	Internal F.A.T.	Sayamol and	implemented in	8	2	2	32
	software	dissatisfaction	<u> </u>	debugged		engineers			is required	Sayom	RCA2 project	T			
			<u> </u>	completely		to help system			(Internal	15 Dec 98		Ī	Ī		************
			<u> </u>			engineers	L		inspection			Ī	Ī		
·			<u> </u>	**************************************		modify and			records and			Ι			
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Acceptance of	Customers do	***************	8	Uncompleted	7	None	10	560	Same above	Sayamol and	Control Doc.	8	2	2	32
hardware and		and rework	ļ	software		***************************************		********		Sayom	D21 was	<u></u>	ļ		
software	hardware and			*********************************		}			of completion	15 Dec 98	implemented in	<u> </u>	<u> </u>		,
····	software	***************************************	ļ	***************************************				 	is required	- -	RCA2 project	ļ			
Prepare DCS	Some	To deliver the	5	The hardware items	6	Visual check	4	120	Pre-delivery	Sayamol and	Control Doc.	5	2	2	20
for delivery	hardware	missing items	Ī	are kept in hurry	***	<u> </u>			review	Sayom	D22 was	†			
	items are	again		manner					checklist is	15 Dec 98	implemented in	1		******	*******
	forgotten to								required		RCA2 project	1			*******
	deliver to site									***************************************	*******************************			*******	
*********************	Do not	To continue	3	The time after F.A.T	7	None	10	210	Internal F.A.T.	Sayamol and	implemented in	3	4	2	24
·	complete the	doing the	·	completion to					is required		RCA2 project	╁┈┤	···		47
***************************************	F.A.T.	punch items		delivery date is		MONO		********	(Internal	15 Dec 98	LOCK PIGNA	!			~~~~
	punch items	at office and		short					inspection			····			*********
	***************************************	go to load the				······································			records and						••••••
	T	software later		***************************************			******		punch lists)		***************************************	 			•••••
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POTENTIAL	FMEA DOC Number	FMEA-PC-001		
FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA)	Page	15	of 16	
ItemDCS Project Process ResponsibilityDCS Project Process	Prepared By	Sayom Surijamongko	4	
DCS System Centum-XL Key Date 1 July 1998	FMEA Date (Orig.)	10 June 1998		
Core Team 1. Sakchai 2. Pongsak 3. Sayom 4. Suniboon 5. Sayamol	FMEA Date (Rev.)	20 December 1998		

Process	Potential	Potential		Potential	0		D			Responsibility	Action	ı Re	sults		
Function	Faiture	Effect(s)	s	cause(s)/	С	Current	e	R.	Recommended	&		s	0	D	R.
and	Mode	of	e	Mechanism(s)	С	Process	t	Ρ.	Action(s)	Target	Actions	e	С	е	P.
Requirements		Failure	v	of Faiture	u	Controls	e	N.		Completion	Taken	l۷	c	t	N.
	1				1		С			Date					
	None	-	-		_	-	-		-	-	-	-	-	-	-
hardware and															
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FMEA Doc Number FMEA-PC-001 FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA) Page 16 of 16 DCS Project Process Item DCS Project Process Responsibility Prepared By Sayom Surijamongkol DCS System Centum-XL Key Date 1 July 1998 FMEA Date (Orig.) 10 June 1998 1. Sakchai 2. Pongsak 3. Sayom 4. Suniboon 5. Sayamol Core Team FMEA Date (Rev.) 20 December 1998

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Severity (S) Evaluation Criteria

Effect	Criteria	Ranking
Hazardous	Hazardous effect. Safety-related sudden failure. Noncompliance with	10
Effect	government regulation.	
Serious Effect	Potential hazardous effect. Able to stop product without mishap; safety-related	9
	; time-dependent failure. Disruption to subsequent process operations.	
	Compliance with government regulation is in jeopardy.	
Extreme Effect	Customer very dissatisfied. Extreme effect on process; equipment damaged.	8
	Product inoperable but safe. System inoperable.	
Major Effect	Customer dissatisfied. Major effect on process; rework/repairs on part	7
	necessary. Product/process performance severely affected but functionable	
	and safe. Subsystem inoperable.	
Significant	Customer experiences discomfort. Product/process performance degraded,	6
Effect	but operable and safe. Nonvital part inoperable.	
Moderate	Customer experiences some dissatisfaction. Moderate effect on product/	5
Effect	process performance. Fault on nonvital part requires repair.	
Minor Effect	Customer experiences minor nuisance. Minor effect on product/process	4
	performance. Fault does not require repair. Nonvital	
	fault always noticed.	
Slight Effect	Customer slightly annoyed. Slight effect on product or process performance.	3
	Nonvital fault noticed most of the time.	
Very Slight	Customer more likely will not notice the failure. Very slight effect on product/	2
Effect	process performance. Nonvital fault noticed sometimes.	1
No Effect	No effect on product or subsequent processes.	1

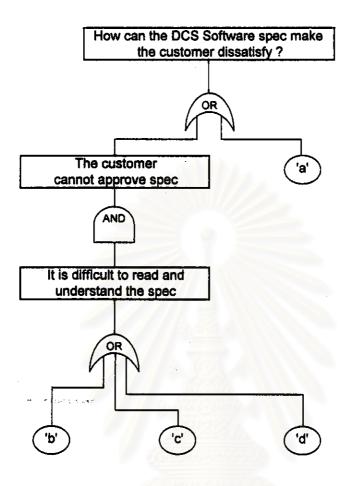
Occurrence (O) Evaluation Criteria

Occurrence	Criteria	Ranking
Almost Certain	Failure almost certain. History of failures exists from previous or similar design	10
Very High	Very high number of failures likely.	9
High	High number of failures likely.	8
Moderately High	Frequent high number of failures likely.	7
Medlum	Moderate number of failures likely.	6
Low	Occasional number of failures likely.	5
Siight	Few failures likely.	4
Very Slight	Very few fallures likely.	3
Remote	Rare number of failures likely.	2
Almost never	Failure unlikely. History shows no failures.	1

**Detection (D) Evaluation Criteria** 

Occurrence	Criteria	Ranking
Almost Impossible	No known controls available to detect the failure.	10
Remote	Remote likelihood current controls will detect the failure.	9
Very Slight	Very slight likelihood current controls will detect the failure.	8
Slight	Slight likelihood current controls will detect the failure.	7
Low	Low likelihood current controls will detect the failure.	6
Medium	Medium likelihood current controls will detect the failure.	5
Moderately High	Moderately high likelihood current controls will detect the failure.	4
High	Good likelihood current controls will detect the failure.	3
Very High	Very high likelihood current controls will detect the failure.	2
Almost Certain	Current controls almost always will detect the failure. Reliable detection controls are known and used in similar processes.	1

# Fault Tree Analysis for the DCS Software Specification Design



'a' = Typing errors

'b' = No relationship of the switch used between pages of the software spec.

'c' = The command used in the flowchart is the machine code. The customer does not understand it.

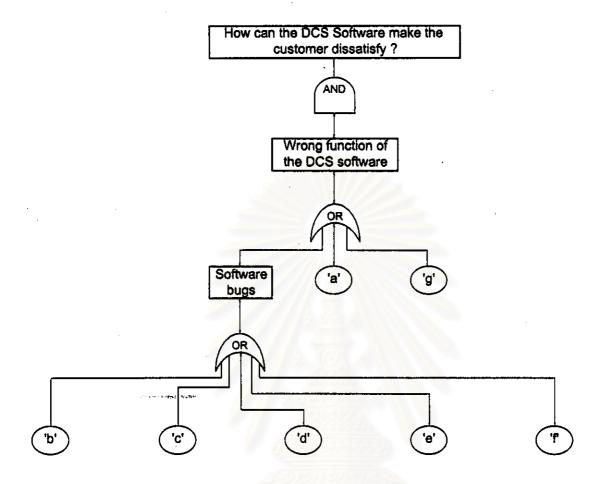
'd' = The customer does not understand the abbreviations used in the spec.

# DOTENTIAL

POTENTIAL	FMEA Doc Number	FMEA-DS-001		•	
FAILURE MODE AND EFFECTS ANALYSIS (DESIGN FMEA)	Page	1	of	1	
ItemSoftware Spec Design Process Responsibility Software Specification Design Process	Prepared By	Sayom Surijamongko	ı —		_
DCS System Centum-XL Key Date 1 July 1998	FMEA Date (Orig.)	10 June 1998			
Core Team 1. Sakchai 2. Pongsak 3. Sayom 4. Suniboon 5. Sayamol	FMEA Date (Rev.)	20 December 1998			

Item /	Potential	Potential	Т	Potential	О		D		T	Responsibility	Action	ı Re	sults		
	Failure	Effect(s)	s	cause(s) /	c	Current	e	R.	Recommended			\$	o	D	R.
	Mode	of	le	Mechanism(s)	c	Process	li	P.	Action(s)	Target	Actions	e	c	e	P.
/		Failure	l v	of Failure	u	Controls	e	N.		Completion	Taken	V	c	ľ	N.
Function			`		1		c			Date	Tancii	"	٦	١,	'``
Easy to read	No relationship	Difficult to	6	No standard form	8	None	10	480	Standard	Suniboon and	Control Doc.	6	3	4	72
and approve the	of the switch	read	1	for software spec	********		1		software spec,	***	D4,D9,D10,D11,	†			<b></b>
	used between	***************************************	<b>†</b>	has been	1	1	1		planning,	15 Dec 98	and D12 were	†			************
	pages of the		1	established			1	<del></del>	software spec	<b></b>	implemented in	t			
	spec	***************************************	<b>†</b>				<b>-</b>	************	design review	***************************************	RCA2 project	<b>†</b>	*****		
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		***************************************	<b>†</b>		+		<b>-</b>		walkthrough	***************************************	*******************************				<del> </del>
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	used in the	do not	† <u></u>	**************************************		•			above	above		<b></b>			
	flowchart is	understand	<del> </del>			<b></b>		*******				<b></b>	******	•	ļ
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	tion used	does not	1			<b>1</b>		******	above	above		i			
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Į.	Inconsistency	Inconsisten-	5					400	Same as	Same as	Same as above	5	3	4	60
	between the	cies							above	above					***********
,	software spec					9									
	of each project														
	Typing errors	Rework	3	Human errors	5	Visual check	2	30			No action				

# Fault Tree Analysis for the DCS Software Design



'a' = Not fulfil the customer's requirements

'b' = Poor software structure (e.g. sequence table structure)

'c' = Mis-use of the software modules (e.g. using stepless instead of the step in the sequence table)

'd' = Use wrong buffers for sending data (e.g. data sending to batch report)

'e' = Typing errors

'f' = Engineers design software in hurry manner

'g' = Customer changes the approved specification

# POTENTIAL FAILURE MODE AND EFFE

PUIENIAL	FMEA Doc Number FMEA-DS-002
FAILURE MODE AND EFFECTS ANALYSIS (DESIGN FMEA)	Page 1 of 2
Item Software Design Process Responsibility Software Design Process	Prepared By Sayom Surijamongkol
DCS System Centurn-XL Key Date 1 July 1998	FMEA Date (Orig.) 10 June 1998
Core Team 1. Sakchai 2. Pongsak 3. Sayom 4. Suniboon 5. Sayamol	FMEA Date (Rev.) 20 December 1998

Item /	Potential	Potential		Potential	0		D			Responsibility	Action	Res	suits		
	Faiture	Effect(s)	S	cause(s) /	С	Current	е	R.	Recommended	&	•	s	О	D	R.
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		Failure	v	of Failure	u	Controls	е	N.		Completion	Taken	l۷	c	t	N.
Function		1			Г		C			Date				Ĭ	
Perform the	Poor software	Difficult to do	7	No experience	6	None	10	420	Standard	Suniboon and	Control Doc.	7	6	5	210
functions	structure	the software						***********	structure, tool,	Sayom	D4,D13,D14,D15				
according to		modification					Ī		walkthrough	15 Dec 98	and D16 were	<b>-</b>			
the customer's						1	<u> </u>	*********	list, planning		implemented in	Ī	******		
requirement								***********	and software	<u> </u>	RCA2 project		*******		
									design review		· · · · · · · · · · · · · · · · · · ·	<b></b>			
j									checklist are	<b></b>	***************************************	<b></b>	,		
						T	1		required	***************************************		*		******	
l								P					********	•	
	Mis-use of the	Mis-function,	7	Do not study the	5	Debug	2	70	-	-	No action	-	-	-	-
	software	rework		instruction manual											************
***************************************	modules	·····		(IM)				**********			****************				
******************************	Use wrong	Mis-function	8	Using many buffers	4	None	10	320	Buffers to be	Same as	Same as above	8	4	2	64
	buffers for			without buffer list					used must	above				*******	
	sending data			or spec			I		be put in the		<b>*************************************</b>				
***********************									software spec	***************************************	*****************************				
	Typing errors	Rework	6	Human errors	5	Visual check	3	90	-	-	No action	-			
	Engineers	Software bugs,	6	Human errors	5	Debug	2	60	***************************************		No action				
		rework	*******			**************************************			***************************************						
***************************************	hurry manner	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	•••••							***************************************	***************************************				************
	Not fulfil the	Rework	8	Short technical	5	None	10	400	Verification of	Same as	Same as above	8	4	5	160
······································	customer's		******	meeting period		•			the software	above		*********			
AP-12-2	requirements		••••••	Misunderstand the			1		design is put						
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•	POTENTIAL	FMEA Doc Number	FMEA-DS-002		
	DE AND EFFECTS ANALYSIS (DESIGN FMEA)	Page	2	of	2
Item Software Design	Process Responsibility Software Design Process	Prepared By	Sayom Surijamongko	ı —	
DCS System Centum-XL	Key Date 1 July 1998	FMEA Date (Orig.)	10 June 1998		
Core Team 1. Sakchai 2.	Pongsak 3. Sayom 4. Suniboon 5. Sayamol	FMEA Date (Rev.)	20 December 1998		

Item /	Potential	Potential	т-	Potential	0		TA		<del></del>	D	ZO DECEMBER 185				
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	Mode	of	e	Mechanism(s)	C	Process	t	P.	Action(s)	Target	Actions	е	С	е	P.
/	•	Failure	٧	of Faiture	u	Controls	е	N.		Completion	Taken	٧	С	ŧ	N.
Function	<u> </u>	<u> </u>	<del> </del>		ſ		С			Date		<u> </u>			
Perform the	Customer	Re-design	8	Customer changes	5	None	10	400	Change order	Suniboon and		8	3	4	96
functions	changes the		<b>↓</b>	control concept				******	procedure and	Sayom	D15 was				
according to	approved		ļ		L			**********	form are	15 Dec 98	implemented in				
the customer's	spec		ļ	······································	L				required		RCA2 project				
requirement			ļ	***************************************	<u> </u>					<b></b>	***************************************				
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# Severity (S) Evaluation Criteria

Effect	Criteria	Ranking
Hazardous without warning	Very high severity ranking when a potential failure mode affects safe DCS control operation and/or involves noncompliance with government regulation without warning.	10
Hazardous with warning	Very high severity ranking when a potential failure mode affects safe DCS control operation and/or involves noncompliance with government regulation with warning.	9
Very High	DCS control operation inoperable, with loss of primary function.	8
High	DCS control operation operable, but at reduced level of performance. Customer dissatisfied.	7
Moderate	DCS control operation operable, but comfort/convenience item(s) inoperable.  Customer experiences discomfort.	6
Low	DCS control operation operable, but comfort/convenience item(s) operable at reduced level of performance. Customer experiences some dissatisfaction.	5
Very Low	Small item does not conform. Defect noticed by most customers.	4
Minor	Small item does not conform. Defect noticed by average customer.	3
Very Minor	Small item does not conform. Defect noticed by discriminating customer.	2
None	No effect.	1

# Occurrence (O) Evaluation Criteria

Occurrence	Possible Failure Rates	Ranking
Very High:Failure is almost	> 1 in 2	10
inevitable	1 in 3	9
High:Repeated failures	1 in 8	8
	1in 20	7
Moderate: Occasional	1 in 80	6
failures	1 in 400	5
Low: Relatively few failures	1in 2,000	4
·	1 in 15,000	3
Remote: Failure is unlikely	1 in 150,000	2
	< 1 in 1,500,000	1

# Detection (D) Evaluation Criteria

Detection	Criteria	Ranking
Absolute Uncertainty	Design control will not and/or can not detect a potential cause/mechanism and subsequent failure mode; or there is no design control.	10
Very Remote	Very remote chance the design control will detect a potential cause/mechanism and subsequent failure mode	9
Remote	Remote chance the design control will detect a potential cause/mechanism and subsequent fallure mode.	8
Very Low	Very low chance the design control will detect a potential cause/mechanism and subsequent failure mode.	7
Low	Low chance the design control will detect a potential cause/mechanism and subsequent failure mode.	6
Moderate	Moderate chance the design control will detect a potential cause/mechanism and subsequent failure mode.	5
Moderately High	Moderately high chance the design control will detect a potential cause/mecha- nism and subsequent failure mode.	4
High	High chance the design control will detect a potential cause/mechanism and subsequent failure mode.	3
Very High	Very high chance the design control will detect a potential cause/mechanism and subsequent failure mode.	2
Almost Certain	Design control will almost certainly detect a potential cause/mechanism and subsequent failure mode.	1

# APPENDIX III THE STANDARDS, PROCEDURES, AND GUIDELINES FOR DISTRIBUTED CONTROL SYSTEM PROJECT (DOCUMENT D1 TO D28)

CUSTOMER	:	
END USER	:	
PROJECT NAME / NO.	:	

# DCS PROJECT REQUEST FORM (D1)

สถาบันวิทยบริการ จฬาลงกรณ์มหาวิทยาลัย

TOTAL NO. OF PAGES [ 2 ]

ABC (THAILAND) LTD.	DOCUMENT APPROVED BY :	DOC NO:	SHT NO.	CONTD SHT NO.	
Filename : D1_1.doc		ABC-D1-001	1	2	٥

ABC-D2-001

CUSTOMER						
END USER	:		· <del>-</del> ·· · · · · · · · · · · · · · · · · ·			
PROJECT NAME	'NO. :					
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# WALK THROUGH LIST PROCEDURE AND FORM

(D4)

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## ORDERING PROCEDURE (D8)

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### INPUT ENGINEERING DOCUMENT CHECKLIST FOR SOFTWARE SPEC DESIGN

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# STANDARD SOFTWARE SPECIFICATION FOR SYSTEM ENGINEERING GUIDELINE (D11)

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### PUNCH LIST FORM (D18)

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## INTERNAL INSPECTION RECORDS (D20)

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## FINAL SAVE PROCEDURE (D23)

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### DOCUMENT SCHEDULE (D25)

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## DETAIL PROJECT SCHEDULE (D26)

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### PROJECT PROGRESS MONTHLY REPORT (D27)

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## NOTICE OF JOB MILESTONE (D28)

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### APPENDIX IV ENGINEERING DATABASE POOL (EDP)

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#### ENGINEERING DATABASE POOL (EDP)

The Engineering Database Pool (EDP) is a software application written for using in the engineering department of the ABC Company. The purpose of the EDP is to serve as a place for database sharing between engineers in the department. The EDP stores the engineering knowledge of the department and the DCS software applications of the past DCS projects. Therefore engineers can enhance their engineering knowledge and also can reuse the software that matches to their requirement for their current DCS project without to redesign the programme again. As a result, the duration of the DCS design process in long term should decrease.

The software is written with the programming language called 'LEVEL 5 OBJECT'. The LEVEL 5 OBJECT is an expert system application development tool that integrates object-oriented techniques and expert system technology with traditional, procedural programming. The 'LEVEL 5 OBJECT' is copyrighted by the Information Builders, Inc., New York (http://www.rulemachines.com/).

There are several graphic panels of the engineering database pool. The panel overviews of the EDP and its relationship between pages are shown on the figure below.

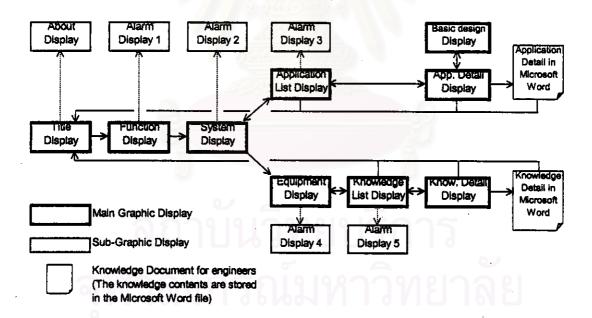


Figure IV-1 EDP Display Relationship

From the figure above, there are nine main graphic displays and six sub-graphic displays. The arrow in the figure represents the connection between panels. The arrow with both head and tail means users can forward to next graphic panels or return to the previous graphic panels whereas the arrow at one end means users can link to another display only in one direction. Each main and sub-graphic display is shown on the following page.

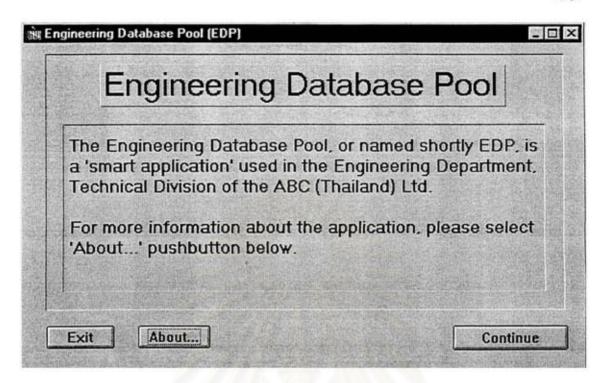


Figure IV-2 Title Display



Figure IV-3 About Display

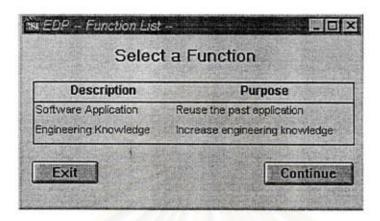


Figure IV-4 Function Display

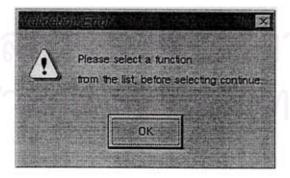


Figure IV-5 Alarm Display 1

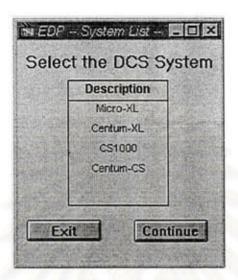


Figure IV-6 System Display

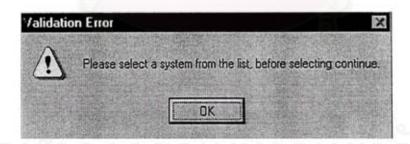


Figure IV-7 Alarm Display 2

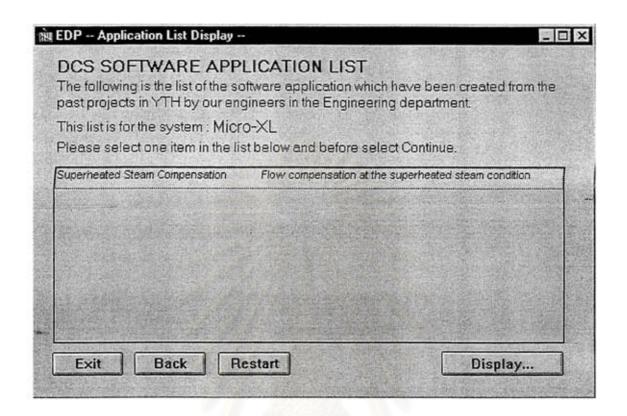


Figure IV-8 Application List Display

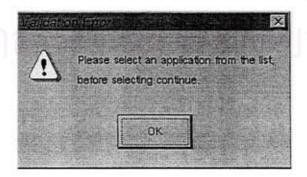


Figure IV-9 Alarm Display 3

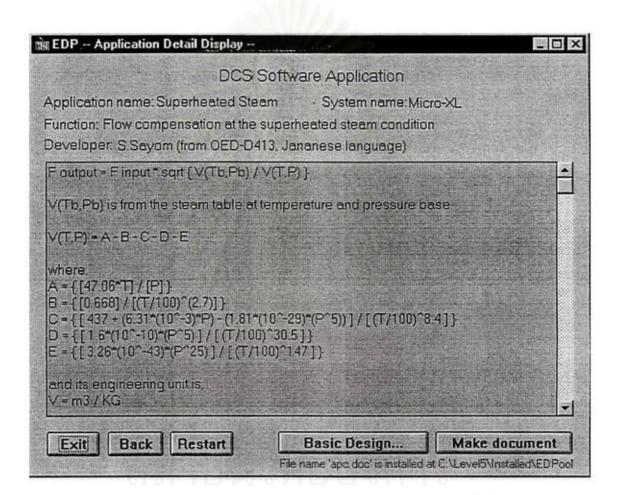


Figure IV-10 Application Detail Display

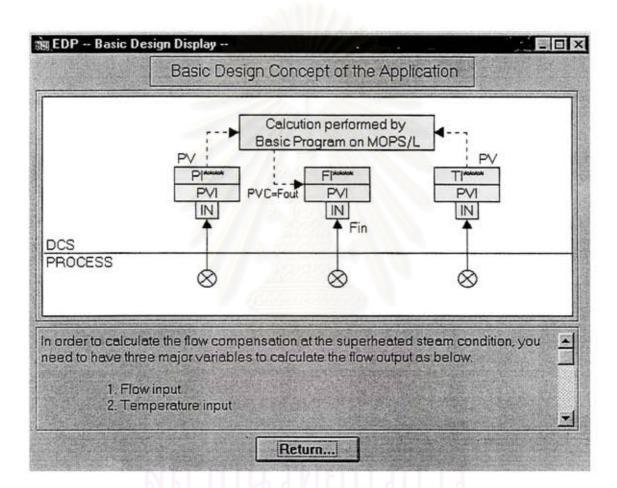


Figure IV-11 Basic Design Display

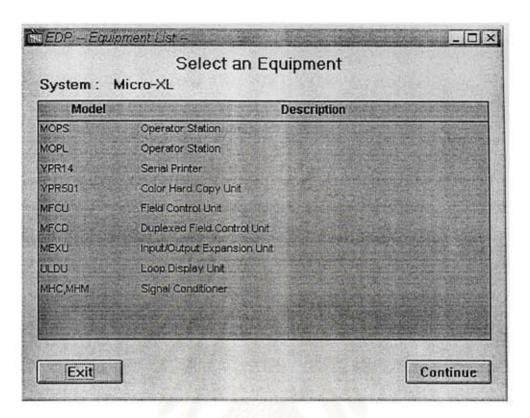


Figure IV-12 Equipment Display



Figure IV-13 Alarm Display 4

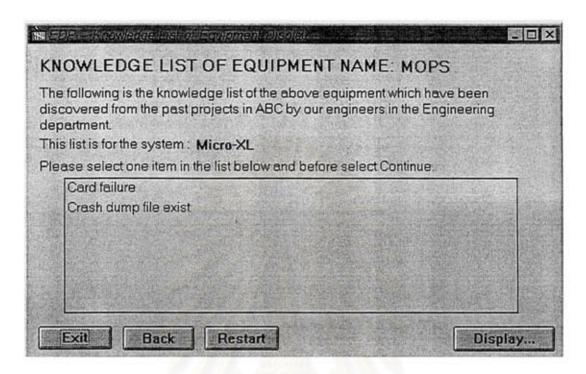


Figure IV-14 Knowledge List Display



Figure IV-15 Alarm Display 5

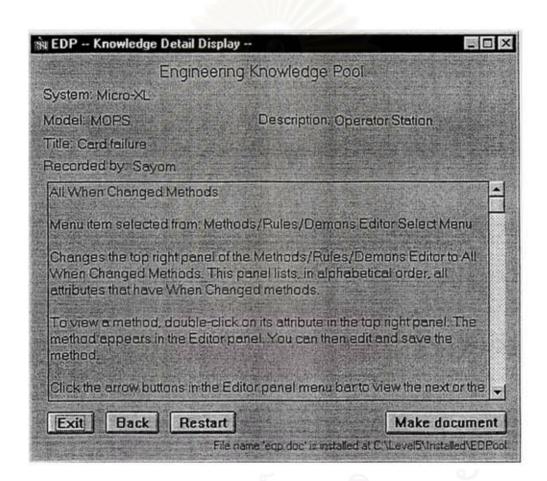


Figure IV-16 Knowledge Detail Display

### APPENDIX V EXAMPLES OF THE CONTROL DOCUMENT IMPLEMENTED IN RCA2 PROJECT

สถาบันวิทยบริการ

จุฬาลงกรณ์มหาวิทยาลัย

Sheet 1 Of 1

#### Walk-Through List

Project Name: Thasco-RCA2

Job Number: D8SJN-001

Attendance: M/S Sayamol (1), Duangporn (2), and Rattanasak (3)

Date: 17 August 1998

Walk-Through List No: 001

Date Of Next Walk-Through: 24 August 1998

Reviewed By : Sayom

S/No.	Items To Be Done	Due Date	Person In Charge	Remarks	Checked By /Date
1.1	To study the Flow compensation concept and give the explanation to K.Duangporn	18 Aug. 98 (till 12 PM)	Sayamol	O.K. 27 Aug. 98	Sayom 28 Aug. 98
1.2	To study the concept of HCl Systhesis Unit (Including giving the explanation to K. Duangporn)	19 Aug. 98	Sayamol	O.K. 27 Aug. 98	Sayom 28 Aug. 98
1.3	To study the concept of the 2 nd Brine Purification.	21 Aug. 98	Sayamol	75 % completed (waiting for S/W peckage)	Sayom 28 Aug. 98
2.1	To generate the DDC loops and one basic program of the flow compensation.	18 Aug. 98	Duangporn	O.K. 27 Aug. 98	Sayom 28 Aug. 98
2.2	To study and generate the input alarm	19 Aug. 98	Duangporn	O.K. 25 Aug. 98	Sayom 28 Aug. 98
2.3	To study and generate the on/off control pump.	20 Aug. 98	Duangporn	O.K. 26 Aug. 98	Sayom 28 Aug. 98
2.4	To study and generate the CO-0501, and SP-0503	21 Aug. 98	Duangporn	O.K. 25 Aug. 98	Sayom 28 Aug. 98
3.1	To complete the relay spec.	17 Aug. 98	Rattanasak	O.K. 20 Aug. 98 (18-19 Aug. 98 did the shutdown job (ICI)	Sayom 25 Aug. 98
3.2	To complete the interposing relay spec.	20 Aug. 98	Rattanasak	O.K. 26 Aug. 98	Sayom 31 Aug. 98
3.3	To complete the marshaling spec-1st part	24 Aug. 98	Rattanasak	Still working	Sayom 28 Aug. 98

#### Walk-Through List

Project Name : Thasco-RCA2

Job Number: D8SJN-001

Attendance: M/S Sayamol (1), Duangporn (2), and Rattanasak (3)

Date : 24 August 1998

Walk-Through List No: 002

Date Of Next Walk-Through: 31 August 1998

Reviewed By : Sayom

S/No.	Items To Be Done	Due Date	Person In Charge	Remarks	Checked By /Date
1.1	To start design (worksheet entry) for S/D matrix	28 Aug. 98	Sayamol	Still working	Sayom 31 Aug. 98
2.1	To study liquid chlorine process	25 Aug. 98	Duangporn	O.K. 25 Aug. 98	Sayom 31 Aug. 98
2.2	To study and generate HCl synthesis process	28 Aug. 98	Duangporn	O.K. 25 Aug. 98	Sayom 31 Aug. 98
3.1	Continue to complete the interposing relay spec	26 Aug. 98	Rattanasak	O.K. 31 Aug. 98	Sayom 31 Aug. 98
3.2	To complete the marshaling spec-2 parts	31 Aug. 98	Rattanasak	Still working (K.Nuchsara also helped him)	Sayom 31 Aug. 98
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Sheet <u>1</u> Of 1

## Walk-Through List

Project Name: Thasco-RCA2

Job Number: D8SJN-001

Attendance: M/S Sayamol (1), Duangporn (2), and Rattanasak (3)

Date : 31 August 1998

Walk-Through List No: 003

Date Of Next Walk-Through: 7 September 1998

1.1		Due Date	Person In Charge	Remarks	Checked By /Date
·	To continue the S/D matrix design	4 Sep. 98	Sayamol	Still working (sttend the meeting on 1- 2 Sep.98)	Sayom 7 Sep. 98
2.1	To generate and test 2 nd Brine	4 Sep. 98	Duangporn	Waiting for S/W package	Sayom 7 Sep. 98
3.1	To complete the marshaling spec	4 Sep. 98	Rattanasak	Still working (ettend the meeting on 1- 2 Sep.98)	Sayom 7 Sep. 98
	e de la company				
	สภาบับวิท	81915	ข การ		
				v	
	จุฬาลงกรณ	มหาว	ทยา	a e	

# Walk-Through List

Project Name: Thasco-RCA2

Job Number: D8SJN-001

Attendance: M/S Sayamol (1), Duangporn (2), and Rattanasak (3)

Date: 7 September 1998

Walk-Through List No: 004

Date Of Next Walk-Through: 14 September 1998

S/No.	Items To Be Done	Due Date	Person In Charge	Remarks	Checked By /Date
1.1	RCA1 S/W modification both graphic and sequence table. (S/D matrix of RCA2 is pending, to be done next week)	11 Sep. 98	Sayamol	Additional job	Seyom 14 Sep. 98
2.1	To complete HCl and Liquid Cl2 and test	8 Sep. 98	Duangporn	O.K. 8 Sep. 98	Sayom 14 Sep. 98
2.2	To start graphic generation	11 Sep. 98	Duangporn	Still working	Sayom 14 Sep. 98
3.1	To complete the marshaling spec.	7 Sep. 98	Rattanasak Nuchsara	Still working (facing problems of document revised by customer)	Sayom 14 Sep. 98
	สถาบันวิท	ยบริ	การ	٠ •	
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Sheet 1

# Walk-Through List

Project Name: Thasco-RCA2

Job Number: D8SJN-001

Attendance: M/S Sayamol (1), Duangporn (2), and Rattanasak (3)

Date: 14 September 1998

Walk-Through List No: 005

Date Of Next Walk-Through: 21 September 1998

S/No.	Items To Be Done	Due Date	Person In Charge	Remarks	Checked By /Date
1.1	To continue worksheet entry for S/D matrix	18 Sep. 98	Sayamol	Currently, 85 % design completion, and 15 % generation	Sayom 21 Sap. 98
2.1	To continue graphic generation	18 Sep. 98	Duangporn	Still working Now, 28 of 43 pages finished	Sayom 21 Sep. 98
3.1	To continue the marshaling spec.	18 Sep. 98	Rattanasak	Still working (Problems of revised document heavily affected to the marshaling spec.)	Sayom 21 Sep. 98
	สถาบันวิ	ทยบริ	การ	0./	
	จุฬาลงกรณ์	มหา	เทยา	ลย	

Sheet 1

# Walk-Through List

Project Name: Thasco-RCA2 Job Number: D8SJN-001

Attendance: M/S Sayamol (1), Duangporn (2), and Rattanasak (3)

Date: 21 September 1998

Walk-Through List No: 006

Date Of Next Walk-Through: 28 September 1998

S/No.	Items To Be Done	Due Date	Person In Charge	Remarks	Checked By /Date
1.1	To continue worksheet entry for S/D matrix	27 Sep. 98	Sayamol	Still working	Sayom 28 Sep. 98
2.1	To continue graphic generation and start MMI	25 Sep. 98	Duangpom	Still working	Sayom 28 Sep. 98
3.1	To finish revising the panel document.	27 Sep. 98	Rattanasak	Still working	Sayom 28 Sep. 98
	สถาบันวิท	เยบริ	การ	0.7	
	จุฬาลงกรณ์	มหาว	ทยา	ลย	
		<u>i</u>			

### Walk-Through List

Project Name: Thasco-RCA2

Job Number: D8SJN-001

Attendance: M/S Sayamol (1), Duangporn (2), and Rattanasak (3)

Date: 28 September 1998

Walk-Through List No: 007

Date Of Next Walk-Through: 5 October 1998

S/No.	Items To Be Done	Due Date	Person in Charge	Remarks	Checked By /Date
1.1	To continue worksheet entry for S/D matrix	2 Oct. 98	Sayamol	O.K. 2 Oct. 98	Sayom 5 Oct. 98
2.1	To finish graphic generation and MMI	2 Oct. 98	Duangporn	O.K. 2 Oct. 98	Sayom 5 Oct. 98
3.1	To finish revising the panel document.	2 Oct. 98	Rattanasak	O.K. 2 Oct. 98	Sayom 5 Oct. 98
	สถาบันวิท	ายบริ	การ		
	จุฬาลงกรณ์	มหาวิ	เกยา	ลีย	

# Walk-Through List

Project Name: Thasco-RCA2

Job Number: D8SJN-001

Attendance: M/S Sayamol (1), Duangporn (2), and Rattanasak (3)

Date: 5 October 1998

Walk-Through List No: 008

Date Of Next Walk-Through: 12 October 1998

S/No.	Items To Be Done	Due Date	Person In Charge	Remarks	Checked By /Date
1.1	To check %AN of the shutdown matrix and revise to the functional spec	5 Oct. 98	Sayamol	O.K. 5 Oct. 98	Sayom 12 Oct. 98
1.2	To generate the calculation (sum, diff, and average) for the graphic	6 Oct. 98	Sayamol	O.K. 6 Oct. 98	Sayom 12 Oct. 98
1.3	To study and generate Logging	9 Oct. 98	Sayamol	Still working	Sayom 12 Oct. 98
2.1	To debug the graphic	9 Oct. 98	Duangporn	Still working	Sayom 12 Oct. 98
3.1	To check the panel document and control sub-contractor mounting the equipment to cubicles	9 Oct. 98	Rattanasak	Still working	Sayom 12 Oct. 98
	สถาบันวิท	ยบริ	การ		
	จุฬาลงกรณ์เ	เหาริ	ทยา	ลัย	

### Walk-Through List

Project Name: Thasco-RCA2

Job Number: D8SJN-001

Attendance: M/S Sayamol (1), Duangporn (2), and Rattanasak (3)

Date: 12 October 1998

Walk-Through List No: 009

Date Of Next Walk-Through: 19 October 1998

S/No.	Items To Be Done	Due Date	Person In Charge	Remarks	Checked By /Date
1.1	To continue generating Logging	16 Oct. 98	Sayamol	Still working	Sayom 19 Oct. 98
2.1	To continue debugging the graphic	16 Oct. 98	Duangporn	Still working	Sayom 19 Oct. 98
3.1	To continue checking the panel document and controlling sub-contractor mounting the equipment to cubicles	16 Oct. 98	Rattanasak	Still working	Sayom 19 Oct. 98
			8		
	สถาบันวิท	ยบริ	การ	<b>₩</b>	
	จุฬาลงกรณ	เหาว	ทยา	ลย	
		5			

Written by: Sayamol/Ooy Witnessed by: Sayom

29-30 Oct 98 Date:

S/No.	Punch Item	Cause	Resolution	Action by	Date of Completion	Checked by (ABC)	Acknowledged (Client)
1	To put %SW0023.PV = 1 at action	A	Put it at %ST001 of both stations	Ooy	29-Oct-98	Sayom	-
	of the sequence table, execute every						
	second (Station 11 and 12)						
2	Calculation of the electrolizer that	М	The function is done in two sequence	Sayamol	10-Nov-98	Sayom	
	relates to graphic page 115 has to		table. One for current use, the other for				
	provide 2 sets: 1. For current use (2 cells)		future use. To change from 2 to 3 cells,				
	2. For future use (3 cells)		scan on/off setting at ENGS is required				
3	IOP function of tag EDI*** and EI***	ō	Done	Sayamol	30-Oct-98	Sayom	
	should be set to 'NO' (not check IOP)				,		
4	EOPS station no.28, alarm message	0	Re-assign number of required tag of	Sayamol	30-Oct-98	Sayom	
	is 'tag overflow'.		station 4 and 5: 16000 tags/one EOPS				
5	Prepare spare sheet of DDC loop for	. A	Done	Öoy	4-Nov-98	Sayom	-
	station 11 and 12 at least one sheet						
6	Prepare logic sequence for SIREN and	Q	The function is done sequence table	Sayamol	11-Nov-98	Sayom	
	BUZZER1 function					 	
7	Prepare the compensation calculation	Α	The calculation is done in basic program	Sayamoi	10-Nov-98	Sayom	-
	of H2SO4 (UI)		named RCA2CALC: run at task 6				
8	Adding timer in shutdown logic	М	Done	Sayamol	9-Nov-98	Sayom	
9	Prepare tag no of 2nd Brine filter	Ď	The tags for EFGW have already been	Sayamol	5-Nov-98	Sayom	-
	and timer for graphic		prepared			T	
10	Prepare Logging doc	A	Done	Sayamol	6-Nov-98	Sayom	-

Legend *

Written by: Sayamol/Ooy Witnessed by:

Sayom 4~5 Nov 98 Date:

S/No.	Punch Item	Cause	Resolution	Action by	Date of Completion	Checked by (ABC)	Acknowledged (Client)
11	Swap I/O address of FI0603 and FI0602	M	FI0603: V-5-5-13	Ooy	10-Nov-98	Sayom	-
	Current address is:		FI0602: V-5-5-12				
	FI0603: V-5-5-12						
	FI0602: V-5-5-13						
12	To change control action of following	D	Correction has been made at:	Ooy	11-Nov-98	Sayom	
	tags:						
	AIC0107A REV to DIR		DDC003				
	AIC0107B DIR to REV	<u>.]</u>	DDC003				
:	AIC0301 REV to DIR	]	DDC003				
	AIC0303 REV to DIR		DDD004				
	LIC0103 DIR to REV	1	DDC011				
	LIC0321 REV to DIR		DDC011				
	LIC0503 REV to DIR		DDC011				
	PIC0502 REV to DIR		DDC007				
	PIC0504 REV to DIR		DDC007				
	TIC0331B REV to DIR		DĐC021				
	TIC0332B REV to DIR	]	DDC021				
	PIC0604 REV to DIR		DDC034				
13	To change output processing of	Ď	Correction has been made at:	Ooy	11-Nov-98	Sayom	
	following tags:						
	PIC0502 DIR to REV		DDC007				
	PIC0505 DIR to REV		DDC017				
	PIC0803 DIR to REV		DDC018				
	PIC0804 DIR to REV		DDC016				
	PDIC0520 DIR to REV	]	DDC026	1 1 1 0			
	FIC0706 DIR to REV	T	DDC029		u		
	PIC0603 DIR to REV		DDC032				
	PIC0604 DIR to REV		DDC034	T			

Legend *

D: Deviation M: Modification A: Addition O: Others

Written by: Sayamol/Ooy Sayom 6~9 Nov 98 Witnessed by:

S/No.	Punch Item	Cause	Resolution	Action	Date of	Date: Checked	6~9 Nov 98 Acknowledged
		*		by	Completion	by (ABC)	(Client)
14	To put FS0303 and its sequence logic	D	Done	Sayamol	6-Nov-98	Sayom	-
	(Refer page 10, Cell Feed Brine PH						*
	control)						
15	Graphic page 101,102,103 when we	M	Done	Sayamol	6-Nov-98	Sayom	-
	touched OUTPUT, it didn't connect to						
	graphic page 105 and touched INPUT,						
	it didn't connect to page 104						*************
16	11SW1010 should be reset at %CL116	M	Add PV(11SW1010)=0 at %CL116	Sayamol	6-Nov-98	Sayom	-
17	Duplicating text at DDC048 at tag no	М	Done	Ooy	9-Nov-98	Sayom	
	11BD002.J04						
18	To correct DDC CALC of FI0603 at	M	Done	Ooy	9-Nov-98	Sayom	
	sheet no DDC034, second line						
	from 6.000 to be 10.0						
	The summation of A+B+C+ in %CL020	М	Done	Sayamol	10-Nov-98	Sayom	
	should be kept in buffer ranging from	N					
	0.0 to 240.0, otherwise the sum would						
	clamp at 128.				*		
	Problems of FI0311B~FI0316B						
20	FI0311A~FI0316A range should be	М	Done	Ooy	9-Nov-98	Sayom	
	changed to 0.0~20.0, not 0~20						
	Fl0311B-Fl0316B range should be	M	Done	Ooy	9-Nov-98	Sayom	-
	changed to 0.0~40.0, not 0~40						

Legend *

# **PUNCH LIST FORM (D18)**

FOR ( ) DEBUGGING (X) INTERNAL F.A.T. ( ) F.A.T.

Written by: Sayamol/Ooy
Witnessed by: Sayorn

9-Nov-98

Date:

S/No.	Punch Item	Cause *	Resolution	Action by	Date of Completion	Checked by (ABC)	Acknowledged (Client)
22	El0311~El0313 have problems when	D	Done	Sayamol	10-Nov-98	Sayom	
****	El0311=80%, El0312=75%, and						
	El0313=60%						
******	The DIFF should be 63, not 62				,		
23	110301=60%, 110302=55%, and	Ď	Done	Sayamol	10-Nov-98	Sayom	
	110303=42%	]					
	The TOTAL should be 31.4, not 30.0				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
24	110301=59%, 110302=45%, and	D	Done	Sayamol	10-Nov-98	Sayom	
	110303=72%						
	The TOTAL should be 35.3, not 30.0						
25	EDI03511~EDI03518, range should be	M	Done	Ooy	9-Nov-98	Sayom	
	0.0~50.0, not 0~50				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		 
26	Similar to previous item, this applies to	М	Done	Ooy	9-Nov-98	Sayom	
	EDI03521~EDI03528						
	EDI03531~EDI03538				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
	EDI03541~EDI03548	1			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
	EDI03551~EDI03558						
	EDI03561~EDI03568				,		
	Range should have one digit after					<b> </b>	
	decimal						L

Ooy

Sayamol

10-Nov-98

10-Nov-98

Sayom

Sayom

Legend * D: Deviation M: Modification A: Addition O: Others

Functional Spec page 13, SV(FIC0701)

should be PV(FIC0701)

Correct divide scale of Ul0511

M

М

Done

Done

28

# **PUNCH LIST FORM (D18)**

FOR ( ) DEBUGGING (X) INTERNAL F.A.T. ( ) F.A.T.

Written by: Sayamol/Ooy
Witnessed by: Sayom

Date: 9-12 Nov 98

<del></del>		<del></del>		<del></del>		Date:	9-12 NOV 98
S/No.	Punch Item	Cause	Resolution	Action	Date of	Checked	Acknowledged
	<u></u>	*		by	Completion	by (ABC)	(Client)
29	To put reset %SW in sequence table	M	Done	Sayamol	10-Nov-98	Sayom	•
L	(its action in the sequence table should						
1	be " ,H" and must have "N")						
	Correct at:11ST113, and 11ST114	*					
30	To correct %ST change ",H" to ",L"	M	Done	Sayamol	10-Nov-98	Sayom	
	Correct at:11ST119, 11ST120, 11ST121						
	and 11ST122						
31	FI0312B uses wrong address	D	Done	Sayamol	11-Nov-98	Sayom	
	V-3-5-11 should be V-3-5-13						
	and Fl0314B: V-3-5-12 should be						
	V-3-5-14		***************************************				
32	Delete unnecessary timer in main S/D	M	Done	Sayamol	12-Nov-98	Sayom	
33	To add this following function:	A	Done	Sayamol	12-Nov-98	Sayom	
	HH ———————————————————————————————————		***************************************				
	Reset by reset input						
34	To check page 9/12 in checksheet which	O	Done	Sayamol	12-Nov-98	Sayom	
	has already revised instrument's ranges						
	with the hardware spec with was com-						
	mented by customer before do any						
	revision						
	WI I	VIII b					

Legend *

Written by: Sayamol/Ooy Witnessed by: Sayom Date: 13 Nov 98

0.44		T =				Daio.	12 1404 30
S/No.	Punch Item	Cause	Resolution	Action by	Date of Completion	Checked by (ABC)	Acknowledged (Client)
35	At graphic page 115, when cell 5 or 6	M	Done	Ooy	13-Nov-98	Sayom	. (0.0/
	is IOP, the PV should be black		***************************************			<u> </u>	
36	FI8621's engineering unit should be	D	Done	Ooy	13-Nov-98	Sayom	
	KG/HR						
37	The modification of H0300B in graphic	М	Done	Sayamol	13-Nov-98	Sayom	
	page 103 should be corrected						
			^				
	***************************************						
	·						
		ANL 16				<b></b>	

Legend *

### **BIOGRAPHY**

Mr. Sayom Surijamongkol was born on 12 February 1970 in Bangkok, Thailand. He graduated a Bachelor degree in Electronics Engineering with the second class honors from King Mongkut's Institute of Technology Ladkrabang (KMIT'L) since 1992. He has joined with a global company, which specialises in control, measurement, and instrumentation. He has experienced in the DCS application software development and DCS project management about seven years till now (1999).

