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APPENDICES

APPENDIX A

RESULT OF CLASSIFICATION AN CODING

The result of classifying products by using external shape and size will be demonstrated in table A.1

Product code					No. of products (Pieces)	
Product type	Overall shape	External shape	Size (Ø, width)	Size (length)		
1	-	0	-	0	0 - x x x	3
				0	1 - x x x	3
				0	2 - x x x	2
				0	3 - x x x	1
				0	4 - x x x	1
				0	5 - x x x	2
				1	0 - x x x	5
				1	1 - x x x	4
				1	2 - x x x	5
				1	3 - x x x	4
				1	4 - x x x	3
				1	5 - x x x	1
				1	6 - x x x	4
				1	7 - x x x	3
				2	7 - x x x	1
				2	8 - x x x	1
				9	2 - x x x	5
				9	3 - x x x	4
				9	4 - x x x	5
				9	5 - x x x	1
1	-	0	-	1	2 1 - x x x	1
				2	2 - x x x	3
				2	3 - x x x	5
				2	4 - x x x	1
				2	5 - x x x	1
				2	6 - x x x	1
				3	2 - x x x	2
				3	3 - x x x	4
				3	4 - x x x	5
				3	5 - x x x	1
				4	3 - x x x	4
				4	4 - x x x	6
				4	5 - x x x	5
				5	2 - x x x	2
				5	3 - x x x	5

	5	4	-	x	x	x		1
	6	3	-	x	x	x		3
	6	4	-	x	x	x		4
	6	5	-	x	x	x		4
	6	6	-	x	x	x		3
	6	7	-	x	x	x		1
	7	3	-	x	x	x		3
	7	4	-	x	x	x		5
	7	5	-	x	x	x		3
	7	6	-	x	x	x		1
	8	3	-	x	x	x		5
	8	4	-	x	x	x		6
	8	5	-	x	x	x		7
	8	6	-	x	x	x		2
	8	7	-	x	x	x		2
1 - 0 - 2	2	3	-	x	x	x		1
	2	4	-	x	x	x		2
	2	5	-	x	x	x		1
	4	3	-	x	x	x		2
	4	4	-	x	x	x		3
	4	5	-	x	x	x		4
	4	6	-	x	x	x		2
	6	3	-	x	x	x		3
	6	4	-	x	x	x		5
	6	5	-	x	x	x		5
	6	6	-	x	x	x		2
	7	3	-	x	x	x		3
	7	4	-	x	x	x		6
	7	5	-	x	x	x		6
	7	6	-	x	x	x		2
	8	5	-	x	x	x		4
	8	6	-	x	x	x		7
1 - 0 - 3	2	1	-	x	x	x		1
	2	3	-	x	x	x		1
	2	4	-	x	x	x		3
	2	5	-	x	x	x		3
	2	6	-	x	x	x		2
	2	7	-	x	x	x		1
	4	3	-	x	x	x		4
	4	4	-	x	x	x		6
	4	5	-	x	x	x		5
	4	6	-	x	x	x		2
	5	3	-	x	x	x		4
	5	4	-	x	x	x		4
	5	5	-	x	x	x		2
	6	3	-	x	x	x		6
	6	4	-	x	x	x		7
	6	5	-	x	x	x		5
	6	6	-	x	x	x		1
	7	3	-	x	x	x		7
	7	4	-	x	x	x		14
	7	5	-	x	x	x		9

	7	6	-	x	x	x		2
	8	3	-	x	x	x		7
	8	4	-	x	x	x		12
	8	5	-	x	x	x		5
	8	6	-	x	x	x		1
	9	4	-	x	x	x		6
	9	5	-	x	x	x		5
	9	6	-	x	x	x		1
1 - 0 - 4	0	1	-	x	x	x		1
	0	2	-	x	x	x		2
	0	3	-	x	x	x		1
	0	4	-	x	x	x		1
	0	5	-	x	x	x		2
	0	6	-	x	x	x		2
	1	2	-	x	x	x		2
	1	3	-	x	x	x		1
	1	4	-	x	x	x		3
	1	5	-	x	x	x		2
	1	6	-	x	x	x		5
	1	7	-	x	x	x		3
	1	8	-	x	x	x		5
	1	9	-	x	x	x		2
	2	3	-	x	x	x		1
	2	4	-	x	x	x		1
	2	5	-	x	x	x		1
	2	6	-	x	x	x		1
	3	4	-	x	x	x		2
	3	5	-	x	x	x		4
	3	6	-	x	x	x		6
	3	7	-	x	x	x		2
	5	7	-	x	x	x		1
1 - 0 - 5	2	2	-	x	x	x		1
	2	3	-	x	x	x		2
	2	4	-	x	x	x		1
	3	5	-	x	x	x		4
	3	6	-	x	x	x		5
	4	5	-	x	x	x		4
	4	6	-	x	x	x		6
	7	6	-	x	x	x		1
	7	7	-	x	x	x		3
1 - 0 - 6	5	5	-	x	x	x		1
	5	6	-	x	x	x		1
	9	6	-	x	x	x		5
1 - 0 - 7	9	6	-	x	x	x		5
1 - 1 - 0	2	1	-	x	x	x		3
	2	2	-	x	x	x		3
	3	1	-	x	x	x		2
	3	2	-	x	x	x		1
	4	1	-	x	x	x		2
	4	2	-	x	x	x		1
	4	3	-	x	x	x		1
	5	2	-	x	x	x		4

	5	3	-	x	x	x	2
	6	2	-	x	x	x	3
	6	3	-	x	x	x	2
	7	3	-	x	x	x	2
	8	3	-	x	x	x	1
	9	3	-	x	x	x	1
1 - 1 - 1	3	1	-	x	x	x	2
	3	2	-	x	x	x	1
	4	2	-	x	x	x	4
	5	2	-	x	x	x	3
	5	3	-	x	x	x	1
	6	2	-	x	x	x	3
	6	3	-	x	x	x	2
	9	3	-	x	x	x	3
1 - 1 - 2	4	1	-	x	x	x	3
	4	2	-	x	x	x	3
	6	2	-	x	x	x	2
	6	3	-	x	x	x	2
1 - 1 - 3	6	3	-	x	x	x	2
1 - 1 - 4	0	6	-	x	x	x	1
	1	5	-	x	x	x	1
	1	6	-	x	x	x	1
	2	5	-	x	x	x	1
	2	6	-	x	x	x	1
	2	7	-	x	x	x	1
	3	5	-	x	x	x	1
	3	7	-	x	x	x	1
1 - 1 - 5	1	5	-	x	x	x	2
	1	6	-	x	x	x	4
	1	7	-	x	x	x	1
	1	8	-	x	x	x	1
	2	5	-	x	x	x	1
	2	6	-	x	x	x	7
	2	7	-	x	x	x	5
	2	8	-	x	x	x	4
	3	5	-	x	x	x	2
	3	6	-	x	x	x	4
	3	7	-	x	x	x	3
	3	8	-	x	x	x	5
	4	5	-	x	x	x	3
	4	6	-	x	x	x	3
	4	7	-	x	x	x	2
	5	5	-	x	x	x	1
	5	6	-	x	x	x	2
	5	7	-	x	x	x	2
1 - 1 - 6	5	6	-	x	x	x	4
	5	7	-	x	x	x	1
	6	6	-	x	x	x	5
	6	7	-	x	x	x	2
1 - 1 - 7	5	6	-	x	x	x	2
	5	7	-	x	x	x	3
	6	6	-	x	x	x	7

				6	7	-	x	x	x		5
1	-	1	-	8	5	4	-	x	x	x	7
				5	5	-	x	x	x		2
				5	6	-	x	x	x		5
				5	7	-	x	x	x		2
Total											<u>592</u>

Table A.1: Products classified by overall shape, external shape, and size

APPENDIX B

TABLE STRUCTURE OF THE DATABASE SYSTE

The structure of the database system can be illustrated in the following tables.

1. tbl_Produce.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_Produce_ID	int	4	Operation ID	
	2	Produce_Code	varchar	50	Operation code	
	3	Produce_Name	nvarchar	200	Operation name	

2. tbl_Plate.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_Plate_ID	int	4	Plating ID	
	2	Plate_Code	varchar	50	Plating code	
	3	Plate_NameTH	nvarcgar	50	Plating name in Thai	
	4	Plate_NameEN	varchar	50	Plating name in Eng	

3. tbl_Component.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_Component_ID	int	4		
	2	Component_Code	varchar	10	Material code	
	3	Component_NameTH	nvarchar	150	Material name in Thai	
	4	Component_NameEN	varchar	150	Material name in Eng	
	5	Component_Kind	nvarchar	30	Shape of material	
	6	Component_Type	nvarchar	30	Type of material	
	7	Component_Price	varchar	30	Price per unit	

4. tbl_ProductAssemble

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_ProductAssemble_ID	int	4		
	2	ProductAssemble_Code	varchar	25	Assemblyproduct code	
	3	ProductAssemble_Name	nvarchar	150	Assemblyproduct name	
	4	ProductAssemble_DrawingNo	nvarchar	20	Drawing number	
	5	ProductAssemble_DrawingName	nvarchar	150	Drawing name	
	6	ProductAssemble_DrawingWriter	nvarchar	20	Drawer	
	7	ProductAssemble_DrawingFileName	varchar	20	FileName	
	8	ProductAssemble_DrawingDate	datetime	8	Drawing date	

5. tbl_Product.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_Product_ID	int	4		
	2	Product_Code	varchar	20	Non-assembly Product Code	
	3	Product_Name	nvarchar	100	Non-assembly Product name	
	4	Product_DrawingNo	nvarchar	20	Drawing number	
	5	Product_DrawingName	nvarchar	100	Drawing name	
	6	Product_DrawingWriter	nvarchar	20	Drawer	
	7	Product_DrawingFileName	varchar	20	FileName	
	8	Product_DrawingDate	datetime	8	Drawing date	

6. tbl_Customer.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_Customer_ID	int	4		
	2	Customer_CompanyName	nvarchar	50	Customer name	
	3	Customer_ContactName	nvarchar	50	Customer contacter	
	4	Customer_Tel	varchar	50	Telephone number	
	5	Customer_Fax	varchar	50	Fax number	
	6	Customer_Credit	int	4	Credit	
	7	Customer_Address	nvarchar	200	Address	

7. tbl_Supplier.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_Supplier_ID	int	4		
	2	Supplier_Name	nvarchar	50	Supplier name	
	3	Supplier_Contact	nvarchar	50	Supplier contacter	
	4	Supplier_Tel	varchar	50	Telephone number	
	5	Supplier_Fax	varchar	50	Fax number	
	6	Supplier_Credit	float	8	Credit	
	7	Supplier_Address	nvarchar	200	Address	

8. tbl_Employee.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_Employee_ID	int	4		
	2	Employee_Name	nvarchar	15	Employee name	
	3	Employee_Surname	nvarchar	30	Employee surname	
	4	Employee_Position	nvarchar	20	Position in the company	
	5	Employee_Tel	varchar	30	Telephone number	
	6	Employee_In	datetime	8	Employed date	
	7	Employee_Out	datetime	8	Resign date	
	8	Employee_Education	nvarchar	20	Education level	

	9	Employee_Salary	float	8	Salary	
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9. tbl_SupplierService.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_SupplierService_ID	int	4		
	2	tbl_Supplier_ID	int	4		tbl_Supplier.dbo
	3	SupplierService_Type	nvarchar	50	Available services	
	4	SupplierService_Price	float	8	Price of each service	

10. tbl_Machine.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_Machine_ID	int	4		
	2	tbl_Supplier_ID	int	4		tbl_Supplier.dbo
	3	Machine_Code	varchar	10	Machine number	
	4	Machine_NameTH	nvarchar	30	Machine name in Thai	
	5	Machine_NameEN	varchar	30	Machine name in Eng	
	6	Machine_BuyDate	datetime	8	Date	
	7	Machine_Price	float	8	Price	

11. tbl_PO_step.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_PO_Step_ID	int	4		
	2	tbl_PO_ID	int	4		tbl_PO.dbo
	3	tbl_Produce_ID	int	4		tbl_Produce.dbo
	4	PO_Step_No	int	4	Operation step in WOS	

12. tbl_ComponentSupplier.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_ComponentSupplier_ID	int	4		
	2	tbl_Component_ID	int	4		tbl_Component.dbo
	3	tbl_Supplier_ID	int	4		tbl_Supplier.dbo

13. tbl_PAPA.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_PAPA_ID	int	4		
	2	tbl_ProductAssemble_ID	int	4		tbl_ProductAssemble.dbo
	3	tbl_Product_ID	int	4		tbl_Product.dbo

14. tbl_PAP.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_PAP_ID	int	4		

	2	tbl_ProductAssemble_ID	int	4		tbl_ProductAssemble.dbo
	3	tbl_Product_ID	int	4		tbl_Product.dbo
	4	Quantity	varchar	5	Quantity	

15. tbl_PlateSupplier.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_PlateSupplier_ID	int	4		
	2	tbl_Plate_ID	int	4		tbl_Plate.dbo
	3	tbl_Supplier_ID	int	4		tbl_Supplier.dbo

16. tbl_PO_Component.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_PO_Component_ID	int	4		
	2	tbl_PO_ID	int	4		tbl_PO.dbo
	3	tbl_Component_ID	int	4		tbl_Component.dbo
	4	tbl_Employee_ID	int	4		tbl_Employee.dbo
	5	tbl_Supplier_ID	int	4		tbl_Supplier.dbo
	6	PO_Component_PONO	varchar	50	PO number of material	
	7	PO_Component_Size	nvarchar	100	Material size	
	8	PO_Component_Quantity	float	8	Quantity	
	9	PO_Component_Price	varchar	8	Price per unit type	

17. tbl_PO_Plate.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_PO_Plate_ID	int	4		
	2	tbl_PO_ID	int	4		tbl_PO.dbo
	3	tbl_Plate_ID	int	4		tbl_Plate.dbo
	4	tbl_Supplier_ID	int	4		tbl_Supplier.dbo
	5	tbl_Employee_ID	int	4		tbl_Employee.dbo
	6	PO_Plate_PONO	varchar	10	PO number of plating	
	7	PO_Plate_Hardset	nvarchar	20	Target hardness	
	8	PO_Plate_Hardget	nvarchar	20	Result hardness	
	9	PO_Plate_Price	varchar	8	Price per unit type	

18. tbl_PO_Work.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_PO_Work_ID	int	4		
	2	tbl_PO_ID	int	4		tbl_PO.dbo
	3	tbl_Supplier_ID	int	4		tbl_Supplier.dbo
	4	tbl_Machine-ID	int	4		tbl_Machine.dbo
	5	tbl_Produce_ID	int	4		tbl_Produce.dbo

	6	tbl_Employee_ID	int	4		tbl_Employee.dbo
	7	PO_Work_StartDate	datetime	8	Operation started date	
	8	PO_Work_Enddate	datetime	8	Operation finished date	
	9	PO_Work_StartTime	char	5	Operation started time	
	10	PO_Work_EndTime	char	5	Operation finished time	
	11	PO_Work_Pass	bit	1	Quality pass	
	12	PO_Work_EmployeeID	int	4	Checked by	
	13	SupPO_NO	varchar	15	PO number of supplier	

19. tbl_PO.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	tbl_PO_ID	int	4		
	2	tbl_Product_ID	int	4		tbl_Product.dbo
	3	tbl_ProductAssemble_ID	int	4		tbl_ProductAssemble.dbo
	4	tbl_Customer_ID	int	4		tbl_Customer.dbo
	5	PONO	varchar	10	CT No	
	6	PO_Quantity	varchar	10	Product quantity	
	7	PO_Ref	varchar	15	Customer PO	
	8	PO_MatPrice	float	8	Material cost	
	9	PO_OutPrice	float	8	Supplier cost	
	10	PO_InPrice	float	8	Manufacturing cost	
	11	PO_SalePrice	float	8	Sale price	
	12	PO_StartDate	datetime	8	Started date	
	13	PO_EndDate	a	8	Delivery date	
	14	PO_StoreDate	a	8	Store date	
	15	PO_PerCheck	varchar	10	Checked by	
	16	PO_PerSend	varchar	10	Delivered by	
	17	PO_PerReceive	varchar	10	Received by	

20. tbl_Password.dbo

Key	No.	Name	Data type	Size	Description	Link
	1	Password	varchar	15	Password	

21. tbl_A.dbo - tbl_W.dbo

Key	No.	Name	Data type	Size	Description	Link
*	1	(tbl_A_ID) - (tbl_W_ID)	int	4		
	2	Code	varchar	50	Code	
	3	Description	varchar	100	Meaning of code	

Table B.1: Database system structure

BIOGRAPHY

Mr. Sutas Suksermsongchai was born on 16 November 1979 in Bangkok. Upon completion to secondary school, he obtained his Bachelor's Degree in Industrial Engineering from Kasetsart University in 2000. Then he spent the next two years working at Can Tech Engineering Company. In 2002, he continued his Master degree in Engineering Business Management at Regional Centre for Manufacturing System Engineering (RCMSE), Chulalongkorn University of Thailand and University of Warwick.

