References



- 1. J.M. Juran, Frank M. Gryna. <u>Quality Planning and Analysis</u>. 3rd edition: McGraw-Hill, 1993
- Ricardo R. Fernandez. <u>Total Quality in Purchasing & Supplier Management 1st</u> edition: St. Lucie Press, 1995
- 3. Barrie G. Dale. Managing Quality.2nd edition: Prentice Hall International (UK), 1994
- Lionel Stebbing. <u>Quality Assurance: the route to efficiency and competitiveness</u> 3rd edition: Ellis Horwood, 1993
- 5. Mohamed Zairi. <u>Measuring Performance for Business Results</u> Chapman & Hall, 1994
- Burt, David N, Managing Product Quality Through Strategic Purchasing. <u>Sloan</u> <u>Management Review</u>. Spring 1989: pp 39-48
- 7. Lamming, R <u>Beyond Partnership Strategies for Innovation and Lean Supply</u> New Jersey: Prentice Hall, 1993
- 8. Michiel R. Leenders. Purchasing and Materials Management. 10th edition: Irwin, 1993
- Robert Monczka. <u>Purchasing and Supply Chain Management</u>. 2nd edition. Cincinnati, Ohio: South-Western, 2002
- 10. Eberhard E. Scheuing. <u>Purchasing Management</u>. Englewood Cliffs, NJ. : Prentice Hall, 1989
- Dale H. Besterfield. <u>Total Quality Management</u>. 2nd edition: Upper Saddle River, N.J.: Prentice-Hall International, 1999
- 12. Stuart F. Heinritz, Paul V. Farrell and Cliftoni Smith. <u>Purchasing: Principle and</u> <u>Applications</u>. 7th edition: Englewood Cliffs, New Jersey: Prentice Hall, 1986
- 13. Lamming, R. <u>Beyond Partnership Strategies for Innovation and Lean Supply</u>. New Jersey: Prentice Hall, 1993
- 14. Camp, Robert C. Benchmarking- <u>The Search for Industry Best Practices that Lead to</u> <u>Superior Performance</u>. Milwaukee: ASQC Quality Press, 1989

Appendices

Appendix A Forms Used in the Old System

Record of Supplier's Product Quality

Vendor's Name Month

No	Product	Quantity	P.O.	Product	Quality	Inspection	Recorded	Remark
	Description	Delivered	No.	Pass	Not pass	Sheet No.	By	
Note:					Number of Total lots			
 Mark Mark Award = (Accepted Lots/Number of Total Lots) x 50 			x 50	Number of Accepted lots				
					Mark Av	warded		
				1	Assessor			

Record of supplier's delivery performance

Vendor's Name	Month

No	Details of	etails of P.O No. Schedule Conformance to agreeme				nent/ Contract	Recorder	Remark	
	Services Performed		Completed Date	Unit of Work	Quality	Timing	Quantity		
			· · · · · · · · · · · · · · · · · · ·						

Supplier's Performance Monitoring Sheet

Vendor's Name	Month

No.	Product	P.O.	Promised	Ordered	Invoice	Actual	Actual	Recorded	Remark
of	Description	No.	Delivery	Quantity	No.	Delivery	Quantity	by	
Deli			Date			Date	Delivered		
very									
								A	
Note:	I				Total Delive	eries			
1. A	1. A shipment is on-time when it is received no later than 3 days				On-time De	liveries			
af	after the promised date and not more than 7 days before the promised date.					ded			
pr									
2. M	ark Awarded = (On-	-time Deliver	ics/Total Deliveri	es) x 50					

Computation of Rating Mark

Vendor's Name Vendor's No For the Year			
Vendor's Name Vendor's No For the Year			
	Vendor's Name	Vendor's No	For the Year

	Mark for	Mark for	Total Mark	%	Remark
	Product	Delivery		change	
	Acceptance	Performance			
January					
February					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					

<u>Note</u> Any drop of supplier's total mark for more three successive months, or a drop more than 20 percent in any month must be reported to the Factory Manager and Purchasing Department

Appendix B

Forms used in the new Incoming Inspection System and the Inspection Plan

Equipment Calibration/ Repair Recording Sheet

No. of tool/ Equipment	Model	Used at Department
Instrument Type	Name of Manufacturer	
Model	Manufactured Date	

<u>Repair Records</u>

Date	Problem	Repair Detail	Remark	Date	Problem	Repair Detail	Remark

Calibration Record

Date of	Reasons	for	Standar	d	Result	Remark	Tested/	Supervisor	Department	Department
Calibration	Calibrating		used	for			Calibrated		Head	Manager
	As	Repair	testing				by			
	scheduled									

Training Record for Inspector/ Purchaser

Employee No.	·····	Name	
Employment date started			

Topics	Training Period	Instructor	Test Result	Instructor's signature
1. Basic properties of				
MMA and testing				
2. Specifications and				
Testing of MMA				
3. Specifications and				
testing of Masking Paper.				
4. Specifications and				
Testing of Additives				
4. Specifications and				
Testing of Glass				
6				
7				
8				

Appendix C

Work Instructions for Incoming Inspection of Key Materials under the New System

ABC C	ompan	y Limited	Page 1/24
Documen	t Title: N	Iaterial Spec and Inspection	Revision No. 1
Documen	t No : S-	-QC-001	Effective From: 01/02/2002
Material	Name:	Pigment (Paste)	
Detail	÷	Used as colorant for cast act	rylic sheet

Specifications

Property	Specification
- General Appearance	Thoroughly Mixed, No separation of pigment and solvent
- dE (color shade difference from standard sample)	<0.8 (compared to the standard of each shade in computer's database)

- QC Inspector picks 1 drum per color of the pigment at random from each lot. Take a sample of 50 kg. from each selected drum and hand in the sample to Lab department head
- Lab conduct tests on the submitted sample following either 1.1 or 1.2 below
- 1.1 Make a sample using 1 percent of the pigment. Size of the sample sheet is according to the standard sample size plus or minus 1%. After the sample sheet is made, measures its color value by spectrophotometer. Procedures to measure the color value should follow that stated in work instruction no. W-QC-001. The color value measured must be in the acceptable range.
- 1.2 Dilute the pigment in the MMA. Use the concentration of 0.1 g/ 100 ml. Dilute the solution in a 100-ml tube. Then take the solution to measure its color value by the spectrophotometer. Follow work instruction no. W-QC-001 in measuring the color using spectrophotometer. The color value must be in the acceptable range.

Document Title: N	Iaterial Spec and Inspection	Revision No. 1
Document No :		Effective From: 01/02/2002
Material Name: Detail	Pigment (Powder) Used as colorant for cast act	rylic sheet
Usage :	Used as pigment for cast ac	rvlic sheet

Property	Specification
- General Appearance	Thoroughly Mixed, No separation of pigment and solvent
- dE (color shade difference from standard sample)	<0.4 (compared to the standard of each shade in computer's database)

- 1.1 Make a sample using 1 percent of the pigment. Size of the sample sheet is according to the standard sample size plus or minus 1%. After the sample sheet is made, measures its color value by spectrophotometer. Procedures to measure the color value should follow that stated in work instruction no. W-QC-001. The color value measured must be in the acceptable range.
- 1.2 Dilute the pigment in the MMA. Use the concentration of 0.01 g/ 100 ml. Dilute the solution in a 100-ml tube. Then take the solution to measure its color value by the spectrophotometer. Follow work instruction no. W-QC-001 in measuring the color using spectrophotometer. The color value must be in the acceptable range.

ABC Company Limited	Page 3/24
Document Title: Material Spec and Inspect	tion Revision No. 1
Document No	Effective From: 01/02/2002
Material Name: Masking Paper Detail Masking Types PS, PS PVC	B, WP, WPB, PE, PEB, PEC, WS, WSB
Usage to be limited on the she	eet for protecting sheet surface
	eet for protecting sheet surface
Usage to be limited on the she Specifications Property	eet for protecting sheet surface Specification
Specifications	

- The inspector picks 1 roll at random from every carton submitted. Measure the width; the value must be within specification. Also check the texture against the agreed sample. If the sample is not within spec, perform 100 percent inspection for that carton.
- From the roll picked up from each carton, cut a piece of paper of the size 1 m x 1m. Measure the paper weight following the instruction in the document titled "how to use digital weighing device" (W-QC-002). The weight measure must be within spec. If not, take one more sample from another roll in that carton. If the second sample still falls outside spec, reject the whole carton. Otherwise accept the carton.

ABC Company Limited	Page 4/24
Document Title: Material Spec and Inspection	Revision No. 1
Document No :	Effective From: 01/02/2002

Material Name:		ABNR, ABIN	
Detail	1.	Chemical name 2.2'-Azobisisobutyronitrile	
Usage	1	to be used as initiator and catalyst for sheet 1.0-3.0 mm. thick	

Specifications

Property	Specification
1. General Appearance	Clear Crystal, no visible impurity
·	
2 Time needed for a standard sample (3 mm.) sheet to solidify	3 hour plus or minus 10 minutes

- Inspector visually check every bag, the material must be clear crystal, and contains no visible impurities. If there is any abnormality, inform QA manager
- QC Inspector randomly picks 100 g of material from every lot and submit the sample to Lab for testing
- Lab uses the submitted sample to make standard sample sheet. The time for the sheet to solidify must be within acceptable range.

ABC Con	pany Limited	Page 5/24
Document Title: Material Spec and Inspection Document No :		Dection Revision No. 1
		Effective From: 01/02/2002
Material Na	ne: ABNV, ABVN	
		A = a lais (2. A dimension to long mitmile)
Detail	Chemical name 2.2	-Azobis (2,4-dimethy teleronitrile)

Specifications

Property	Specification
1. General Appearance	Clear Crystal, no visible impurity
2 Time needed for a 4 mm. sheet of standard size (1 ft x 1 ft) to solidify	4 hour plus or minus 20 minutes

- Inspector visually check every bag, the material must be clear crystal, and contains no visible impurities. If there is any abnormality, inform QA manager
- QC Inspector randomly picks 100 g of material from every lot and submit the sample to Lab for testing
- Lab uses the submitted sample to make standard sample sheet. The time for the sheet to solidify must be within acceptable range.

Appendix D Supplier Rating Forms in the New Supplier Evaluation System

Supplier Rating Form

Category: Product Quality Maximum possible marks: 40 marks

<u>Direction</u>: Points in this category should be rated by Production Manager, Quality Assurance, Lab or users of the material

 Conformance to specifications: Rate supplier for compliance with ABC's specifications, requirements as stated in the Purchase Order or Contract. This compliance also extends to cover provision of technical information such as material safety data sheet as requested by Purchasing.

[]	Very Satisfied	[15 marks]
[]	Satisfied	[10 marks]
[]	Partially Satisfied	[5 marks]
[]	Unsatisfied	[0 marks]

2. Returns due to defects: Before rating on this measure can be done, QA should provide necessary documented quality history of the supplier under rating. The record must contain at least return history and rework.

[]	No shipment returned and/ or no reworks	
		performed since the last evaluation	[10 marks]
{]	Partial shipment returned and/ or small amount	
		of reworks performed (less than 5 percent)	[5 marks]
[]	One or more total shipments returned and/ or	
		a high amount of rework performed	[0 marks]

3. Internal Quality Control- Check whether the supplier has a formal quality manual and rate the manual based on its content.

[]	Manual exceeds Acron's requirements	[5 marks]
[]	Manual meets Acron's requirements	[3 marks]

[] Manual partially meets Acron's

specifications	[2 marks]
[] Manual exists but does not meet Acron's	
requirements	[1 mark]
[] No manual exists	[0 mark]

4. Safety Program: whether the supplier has a quality program in place

[] Employee safety training program in place,	
monitored, and reported	[5 marks]
[] Safety manual available to employees at time of	
employment	[6 marks]
[] Safety program in place without regular training	[2 marks]
[] No safety program in place	[Û mark]

5. Quality Training

[]	Employee quality training program	[5 marks]
[]	No employee quality training program in place	[0 mark]

TOTAL MARKS ATTAINED

= ____/ 40 marks

. .

Other Comments:	

Supplier Rating Form

Category: Delivery & Price Maximum Possible Marks: 40 Marks

Direction: This form should be rated by Stock and Purchasing.

1. Quoted Delivery Lead Time: How is the lead time quoted by this supplier compared to others selling the same or similar material.

[]	Obviously better than other suppliers	[6 marks]
[]	About the same as other supplies	[5 marks]
[]	Within 1 weeks compared to other suppliers	[4 marks]
[]	Within 2 weeks compared to other suppliers	[3 marks]
[]	Within 2-4 weeks compared to other suppliers	{1 mark}
[]	Lead time much longer than other suppliers	[0 mark]

2. Fulfillment of order : From the last evaluation, how many percent of deliveries have been fully fulfilled (in term of quantity). In rating this characteristic, material receipt record from Stock is needed.

[] 90-100 % of total deliveries	[7 marks]
[] 80-89% of total deliveries	[5 marks]
[] 70-79% of total deliveries	[3 marks]
[] 60-69% of total deliveries	[2 marks]
[] Below 59% of total deliveries	[0 mark]

3 Actual delivery compared to quoted delivery (On-time deliveries of goods and services): How many percent of materials have been delivered on-time?

[]	100% of total deliveries/ services	[12 marks]
[]	90-99% of total deliveries/ services	[10 marks]
[]	80-89% of total deliveries/services	[8 marks]

. .

[]	70-79% of total deliveries/ services	{	7 marks]
[]	60-69% of total deliveries/ services	[6 marks]
[]	50-59% of total deliveries/ services	[5 marks]
[]	49% of total deliveries/ services	[0 marks]

Note: Reduce score by half if any delivery is more than 30 days late.

 4
 Packing according to specification

 []
 Packaging usually meets specification (90 percent up)
 []

 []
 Packaging sometimes to specification
 []

 []
 Packaging not to specification
 []

 []
 Packaging not to specification
 []

5. Quoted net price compared to other competitors (plus or minus 5%)

[] In line with competition (plus or minus 5 percent)	[3 marks]
[] Not in line with competition	[0 mark]

6. Price stability since last evaluation (plus or minus 5%)

[] Plus or minus 5%		[3 marks]
[] Not in line with previous quotations	(greater than 5%)	[5 marks]

7. Low bidder (net price): 3 marks possible

[]	The supplier is the low bidder	[3 marks]
[]	The supplier is not the low bidder	[0 mark]

8: Offering of special payment terms:

[] 2% 10, net 30	or better	[3 marks]
[] 1% 10, net 30	or equivalent	[2 marks]
[] 0.5% 10, net 30) or equivalent	[0 mark]

TOTAL ATTINED MARKS = ______40 marks

Other Comments:

Supplier Rating Form

Category: Service Maximum Possible Marks: 20 Marks

<u>Direction</u>: This form is to be rated by those who have contacts with the supplier in these departments: Purchasing, Laboratory, Accounting, Users, and Engineering

1. **Responsiveness to problems**: In case there is problem, how fast does the supplier respond and how much is their involvement in the problem solving? Is there any on-site assistance and how is the availability?

[]	Highly responsive	[5 marks]
[]	Fairly responsive	[3 marks]
[]	Not responsive	[0 mark]

2. **Compliance with billing requirements** (to be rated by Accounting) Completeness and Correctness of related accounting documents.

[] Invoice usually legible with all necessary data	[5 marks]
e.g., P.O number, line item, price, etc.	
[] Invoices sometimes correct	[l mark]
[] Invoices always incorrect or missing data	$\{0 \text{ mark}\}$

3. Job performance: (to be rated by production manager, project leader, and/ or user). Job was performed in a timely manner in accordance with agreed upon start and completion dates

[] Project started and completed on-time or early	[5 marks]
[] Project started on-time or early	[2 mark]
[] Project completed on time or early	[2 marks]
[] Project started late and completed late	[0 mark]

4. Readiness for information requested (to be rated by Purchasing)

[] Quotation and specifications are prepared fast and according	[5 marks]
to the company's request	
[] Quotation and specifications are prepared reasonably fast	[3 marks]
and fulfill company's request	
[] Quotation and specifications are prepared slowly and fails	[0 mark]
to fulfill company's request	
TOTAL/20 marks	
Other comments	

Supplier Rating Form

Category: Financial Stability (NO POINT)

Direction: This form is to be rated by Accounting and Finance Department. There is no point given to this category, but it is the company's policy to deal with suppliers with good credit and financial stability only

Rate each area in S or U (S = Satisfactory, U = Unsatisfactory)

1. Credit check: Considering from the supplier's history and submitted documents, rate the supplier' credit as S or U. Also provide comments

2. Annual report (where available): Rate S or U after review of annual report.

Documents required for credit financial stability assessment (if available)

- 1. Company Registration Form
- 2. Financial statement for the past 3 years
- 3. Company Profile and business plan (if possible)
- 4. Any other documents deemed necessary by the Company

Supplier Audit Form/ Questionnaire

Audited Area: Qua	dity Management
-------------------	-----------------

1. Is there a program in place to improve process and productivity	543210 N/A
2. Is there evidence of full support from top management for improvement of process/ program	543210 N/A
3. How is satisfying customer's needs emphasized, and is there emphasis on doing things right first time and continuous Improvement?	5 4 3 2 1 0 N/A
4. Is a Quality Policy published, posted, accessible to all employees?	543210 N/A
5. Is the Quality Policy communicated and understood by all employees?	543210 N/A
6. Is there formal training/ education for all employees?	543210 N/A
7. Are statistical methods and techniques being used to guide action on process control to more consistently meet customer product and service requirements?	5 4 3 2 1 0 N/A
8. Is the team approach utilized to bring about improvements in quality and process?	5 4 3 2 1 0 N/A
9. Is thee evidence of good housekeeping and safe practices	5 4 3 2 1 0 N/A

Supplier Audit Form/ Questionnaire

Audited Area: Quality Assurar	ice
-------------------------------	-----

1.	Does the company have a quality manual? If so,5 4 3 2 1 0 N/AIs it up-to-date and accessible to all employees?
2.	Are there standardized procedures/ work instructions? If so, Yes No are they:
	 a. Consistent with the Quality Manual? b. Accessible to concerned people? c. Current and up-to-date? d. Supporting ABC's quality needs? e. Adequately adhered to? d. Supporting ABC and the set of the
	Is there a documentation system to control material/ equipment 5 4 3 2 1 0 N/A through all stages of production so that identification status and tractability are maintained?
4.	Briefly describe what gauges or test/ measuring equipment are being used in each of the following areas:Incoming materialsIn-process materialsFinal materials
	 a. Is there a written schedule for the calibration of testing/ 3 2 1 0 N/A measuring equipment and is it being followed?
	b. Do these standards used for calibration refer to 3 2 1 0 N/A recognized reference sources?

	 c. Are calibration records kept for sufficiently long period d. Are gauges and test/ measuring equipment well maintained?3 2 1 0 N/A
5.	Is there a system to ensure that defective materials are 5 4 3 2 1 0 N/ A separated properly from good ones?
6.	Is there a written policy for the disposition of nonconforming $5 4 3 2 1 0 N/\Lambda$ finished product?
7.	Is there a procedure to perform internal quality audit? 5 4 3 2 1 0 N/A
8.	Is there a defined, closed-looped "corrective action system" 5 4 3 2 1 0 N/A which focuses on prevention of nonconformance and failure?

Supplier Audit Form/ Questionnaire

1.1

Audited Area: Material Control

1. Is there a formal system for evaluation, selection and rating of suppliers, and also supplier developme	5 4 3 2 1 0 N/A ent program?
2. Is supplier certification or approval required prior to the purchase of critical materials?	543210 N/A
3. Are supplier regularly monitored? How?	5 4 3 2 1 0 N/A
4. Are suppliers of critical materials required to demo good control of their processes?	onstrate 5 4 3 2 1 0 N/A
 Are specifications for all purchased materials clear In written documents? 	and 543210 N/A
6. Can materials be traced or identified to test/ inspection report?	5 4 3 2 1 0 N/A
7 Is there written sampling and testing procedures for all materials?	543210 N/A
8. Are incoming materials inspected, documented, an monitored before used in production and are accurate records maintained?	
9. Is there a formal procedure for the disposition of defective materials? If so, how are they handled?	5 4 3 2 1 0 N/A
10. Are rejected incoming materials identified and phy separated to a new area prevent use?	sically 5 4 3 2 1 0 N/A

11. Do you subcontract work to external sources? If so, 5 4 3 2 1 0 N/A Is there an adequate control to assure quality of the subcontracted work?

Supplier Audit Form/ Questionnaire

Audited Area: Process Contro	3
1.Is there a written sequence or flow diagram detailing the manufacturing/ administrative sequence/ process?	543210 N/A
2. Are statistical control measurements and methods being used to determine process stability and reduction of product concerns?	543210 N/A
3.Is the process under continuous control and capable of meeting ABC's quality requirements?	543210 N/A
4. Is there a system which is to indicate the status of processes and material status at each stage throughout the manufactur	5 4 3 2 1 0 N/A
5.1s there a good system to record process changes?	543210 N/A
6.Is there a policy to inform customers of changes that could affect quality of the product?	543210 N/A

÷.

Supplier Audit Form/ Questionnaire

Audited Area: Customer Service

1 Are there records maintained that show compliance with ABC's requirements regarding shipping and handling of goods?	543210 N/A
2. Is there inspection before products are packed and shipped? If so, what formal sampling plan is utilized?	3210 N/A
3. Is there verification before to shipping to make sure all purchase order requirements and shipping instructions have been	5 4 3 2 1 0 N/A en met?
5 Is there a system to monitor delivery performance? If so, how?	543210 N/A
6 Is there a program to continuously improve delivery performance? If so, how?	5 4 3 2 1 0 N/A
7. Is there documented evidence for each of the following?:	
A. Reduced set-up times	3210 N/A
B. Reduced set-up scrap	3210 N/A
C. Reduced lead times	3 2 1 0 N/A
8. Is there an effective system in place for addressing, concerns?	5 4 3 2 1 0 N/A

Computation of Audit Marks

	Audit Marks	Total Possible Marks
		IVIAIRS
Quality Management		
Process Control		
Customer Service		
otal Actual Mark		
		larks
	Minus NA's	
	Total Adjusted	
	Marks	
/ abtained - total astual		
70 obtained – totai actuar	mark/ total adjusted mark	- %
valuation conducted by:		
Evaluation conducted by:		
Evaluation conducted by:		

Supplier Information

Established in:			
Number of personnel		Manu	Ifacturing
		Admi	inistrative
		QA/	QC:
Facility			
Overall size of faci	lity	sq.m. Age of bu	ilding:sq.m.
Estimated producti	on area	sq.m. Free	area for future expansion
sq.m.			
Estimated storage	area	sq.m.	
Production Capa	city		
Production Capa Production full cap	city		
Production Capa Production full cap Present production	city pacity		% of capacity
Production Capa Production full cap Present production Any plan to expan	city bacity a level is at d capacity within		% of capacity No

Biography

Mr. Kriangkari Cherngwiwatkit was born in Bangkok in 1976. He earned his bachelor's degree in civil engineering from Chulalongkorn University in 1997. After graduation, he started working as a technical support engineer at a land surveying company for about 1 year. After that, he changed his career to manufacturing field and had been working as the administration manager of a plastic company when he decided to participate in the joint Master's degree program at the Regional Center for Manufacturing Systems Engineering. The program was a joint academic initiative run by Chulalongkorn University and the University of Warwick of the U.K. He was enrolled as a part-time student and graduated in the academic year 2002.

